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Interdepartmental Committee on Nutrition for National Defense

By
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EARLY in 1955 after approval by OCB, (Office Chief of Budget) a formal Memo of Agreement was entered into by the Departments of Defense, State, Agriculture, Health, Education, Welfare, and FOA (now International Cooperative agency) establishing the Committee; Department of Defense designated Chairman. Subsequently the Atomic Energy Commission became a participant. The purpose of the Committee is to prevent duplication among Federal agencies, to coordinate various projects and studies on nutrition in those countries in which the United States has a special interest, to assess findings and prepare reports and recommendations for the agencies concerned. The ultimate objective of the program is to assist the countries concerned in the establishment of nutritional services within their country to enable them eventually to help themselves. This last phase involves training indigenous personnel during the surveys and transfer of basic laboratory equipment and supplies.

To date nutrition surveys have been completed in Iran, Pakistan, Korea, Turkey, and the Philippines, Libya, Alaska, Spain, Ethiopia, Peru, Ecuador, Viet-Nam, Chile, Colombia, Taiwan and Thailand and arrangements have been completed for assisting Lebanon in February 1961. For the coming fiscal year the Committee has received official invitations transmitted through State Department channels from the Governments of Burma and Uruguay. These are scheduled for FY 1962. In addition expressions of interest for assistance in nutrition appraisals have been received from the Federation of West Indies, from Spain to assist in a survey of the Spanish Sahara, Bolivia, Brazil, Malaya, Ceylon and Indonesia.

The average cost of the surveys has been approximately $71,000. A total of 194 specialists have taken part in these activities. Personnel have been furnished by 27 universities and colleges, 24 other agencies and 6 other countries have furnished team personnel, namely Turkey, Spain, Great Britain, Canada, Ireland, and The Netherlands. These consultants receive the normal per diem and the usual rate of pay as established by the Federal government for consultants.

The handbook (Manual for Nutrition Surveys) has been published in English, French and Spanish and has had world wide distribution. Approximately 3,000 copies have been distributed. Over 100 sets of special clinical slides depicting the major nutrition deficiency lesions have been distributed in the countries surveyed and throughout many colleges and universities in the U. S. The slides, manual and reports

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of the survey findings are being utilized for teaching purposes by medical schools throughout the U. S. The reports of the majority of the countries surveyed have been translated into their native language. Approximately 1,000 copies of each country's report have been distributed, including all the U. N. agencies.

These nutrition activities are conducted on a people-to-people approach designed primarily to assist the country in using its own resources to best advantage. An important phase of the country's program is its follow-up in order to assure progressive action by the cooperating countries.

The work of the Committee has led to the creation of an Armed Forces Internation Nutrition Committee which has now held four conferences: in Iran in 1956; Turkey in 1958; Pakistan in 1959; and the recent one in the United States in August 1960. This was attended by 35 delegates from 17 countries including representatives from the World Health agencies of the U. N.

This is also a reciprocal program. The fact that the members of the team from our universities had the opportunity to study nutritional and other diseases throughout the world not only assists the given countries in definition of the major problems, but in turn they bring back valuable information which is incorporated into their teaching and research activities. These staff members have contributed greatly to carrying out a true people-to-people program of scientific cooperation and personal friendship. We are firmly convinced that this program has assisted in emphasizing in no small measure to the developing countries the necessity to initiate active programs so as to fulfill the basic needs of the greatest majority of their population, namely food and health. The hungry, underfed, malnourished populations have little concern for anything but the basic needs of food and well being. When subject to ravages of disease, their productive capacity is further diminished.

Universities and Colleges Furnishing Personnel for the Nutrition Program

Vanderbilt University
Pennsylvania State University
Oregon State College
Texas A and M
University of Rochester
Virginia Polytechnic Institute
Temple University
Ohio State University
New York University
Harvard University
University of Wisconsin
Cornell University
University of Maryland
University of Illinois
Tulane University
University of Florida
University of Minnesota
Washington University (St. Louis)
Columbia University
Michigan State University
University of Michigan
University of California
North Carolina State College
Oklahoma State University
University of Texas
University of Alabama
University of Arkansas

Total—*27*

Other Cooperating Agencies Furnishing Personnel for Nutrition Program

New York State Department of Health
Williams-Waterman Fund for the Combat of Dietary Diseases
U. S. Army—Office of the Surgeon General
U. S. Army Medical Research and Nutrition Laboratory
Walter Reed Army Institute of Research
Armed Forces Institute of Pathology
Veterans Administration
U. S. Public Health Service
National Institute of Arthritis and Metabolic Diseases
National Cancer Institute
National Heart Institute

National Institute of Dental Research
Food and Drug Administration
Department of Agriculture (Western Regional Research Laboratory)
Department of the Navy
Naval Medical Research Center
National Research Council
Presbyterian-St. Luke's Hospital, Chicago
Wellcome Research Laboratories
Wisconsin Alumni Research Foundation
American Medical Association
UNICEF, United Nations
Akron City Hospital
Pan American Health Organization
Total—24

SURVEY COST

	Total	*MAP Support Funds*
Iran, January 1956	$ 47,000	$ 25,000
Pakistan, January 1956	47,000	25,000
Korea, June 1956	25,000[1]	
Philippines, February 1957	62,000	62,000
Turkey, April 1957	65,000	65,000
Libya, June 1957	84,000	84,000

FOURTH ARMED FORCES INTERNATIONAL NUTRITION CONFERENCE HELD AT WALTER REED ARMY INSTITUTE OF RESEARCH, WALTER REED ARMY MEDICAL CENTER, WASHINGTON, D.C., AUGUST 1960. 1st Row (L to R): Dr. A. E. Schaefer (USA), Major Gen. F. Lu (Chinese Embassy), Dr. H. D. Cremer (Germany), Brig. Gen. R. Gauhari (Iran), Colonel C. K. Hasan (Pakistan), Brig. Gen. S. Deyhimi (Iran), Major Gen. C. Cabrera (Ecuadorean Embassy), Brig. Gen. M. A. Chams (Iran), Brig. Gen. M. M. Fekrat (Iran), Colonel M. N. Ansarian (Iran); 2nd Row (L to R): Colonel Z. M. Tolgay (Turkey), Ato E. Borrou (Ethiopia), Dr. J. L. Liverman (USA), Colonel L. M. Hursh (USA), Dr. F. Mejia C. (Colombia), Lt. Col. H. Rubiano G. (Colombia), Dr. C. Collazos C. (Peru), Lt. Col. J. Hernandez G. (Spain), Dr. F. Recalde M. (Ecuador), Dr. Max Myers (USA); 3rd Row (L to R): Dr. A. C. Curtis (USA), Colonel W. S. Kefle (Ethiopian Embassy), Mr. T. B. Khanh (Vietnamese Embassy), Lt. Col. J. Behm (Chile), Dr. J. V. Santa Maria (Chile), Dr. J. M. Hundley (USA), Major J. M. Morante M. (Peru), Mr. M. A. Farooquae (Pakistan), Dr. N. L. Dinh (Viet-Nam), Dr. J. G. Bieri (USA), Major R. C. Singer (USA); 4th Row (L to R): Dr. J. A. Shannon (USA), Dr. J. B. Youmans (USA), Dr. C. R. Pascual (Philippines), Mr. C. M. Purves (USA), Mr. W. M. Rudolph (USA), Dr. J. A. Uram (USA), Dr. R. Van Reen (USA), Dr. E. C. Leatherwood (USA); 5th Row (L to R): Lt. D. G. McQuarrie (USA), Dr. S. Bayne-Jones (USA), Dr. F. L. Soper (USA), Miss A. Lowdon (United Kingdom), Miss J. Ebbs (USA), Mr. H. Allen (USA); 6th Row (L to R): Rear Admiral C. B. Galloway (USA), Capt. F. P. Ellis (United Kingdom), Dr. E. P. Campbell (USA), Dr. A. G. Peterson (USA), Mr. W. G. Baylis (USA), Dr. A. L. Forbes (USA), Dr. A. G. van Veen (FAO).

Alaska, February 1958	18,000[1]	
Spain, April 1958	77,000	77,000
Ethiopia, September 1958	100,000	100,000
Peru, April 1959	85,000	85,000
Ecuador, July 1959	85,000	85,000
Viet-Nam, October 1959	95,000	95,000
Chile, March 1960	104,500[4]	101,500
Colombia, May 1960	81,500[3, 4]	52,600
Taiwan, September 1960	51,000[3]	51,000
Thailand, October 1960	105,000[3, 4]	94,000
Lebanon, March 1961	79,000[3, 4]	68,000
Average, all surveys	71,235	

[1] ICNND Secretariat funds

[2] Estimated—Includes budget for completion in FY '61

[3] Estimated—Surveys in progress in FY '61

[4] Partial support for civilian studies from NIH

[5] All Defense funds are allotted by the Assistant Secretary of Defense (ISA). None are included in the budget of the ASD (H&M).

MAP SUPPORT—NUTRITION PROGRAM AND FOLLOW-UP

	Budget Allotment	*Budget Expenditures*	*Secretariat Budget for Surveys*
FY 1956	$ 50,000	$ 50,000	$60,000
FY 1957	200,000	164,000	9,000
FY 1958	208,500	174,000	
FY 1959	275,000	274,000	
FY 1960	357,000	356,500	31,000 (NIH)
Total—'56-'60	$1,090,500	$1,018,500	
FY 1961	350,000		

Accomplishments: the question is frequently asked: What have these surveys actually accomplished? Let us consider the results country by country.

IRAN

An Armed Forces nutrition committee and Institute were formally established following the medical nutrition survey in early 1956 and research on foods is in progress.

A modern food and nutrition laboratory was completed in 1959. A nutrition team of the Iranian Armed Forces has conducted independent surveys in various areas of the country. These have revealed evidence of marked improvement in nutrition and health following the implementation of the recommendations of the 1956 appraisal.

In the autumn of 1956 the Shahi Food Canning Plant, which had been discontinued, was reopened with the assistance of the U. S. ICA Operations Mission. The first Iranian Armed Forces field-type ration was developed using these products. In the first year of operation, the local farmers received an added cash from income of $250,000 as the result of the reopening of this cannery. A second and third food cannery are now under construction.

At the Shahi Cannery, Veterinary Officers of the Imperial Iranian Armed Forces serve as food inspectors. As a result of the 1956 food survey, the First Armed Forces Internation Nutrition Conference was held in Teheran with attendance by delegates from Pakistan, Turkey, Iraq, the United Kingdom and the United States.

PAKISTAN

An Armed Forces Nutrition Service Advisory Group of Consultants was established as recommended by the nutrition survey in 1956, and an Armed Forces Institute of Nutrition was formed. Food processing has expanded rapidly under the ICA Operations Mission. Close liaison with civilian agencies has been established. Special studies in food deficiencies have been made. A former Surgeon General, Lt. General W. A. Burki of the Armed Forces, now Minister of Health and Labor, is extending the nutrition program to the civilian population. Pakistan sponsored the Third Armed Forces Internation Nutrition Conference of 1959, with delegates from Iran, Turkey, Libya, Great Britain, Foreign Agriculture Operations of the United Nations and the United States.

TURKEY

A Turkish Armed Forces Nutrition Institute was officially established and a new ration law enacted by the Government of Turkey. It was followed by menu and ration issue changes which resulted in a nutritionally improved diet. This was the first change in the ration law for the Armed Forces

since 1915. A school for training cooks, bakers and mess officers has been established and cooperative studies made with staffs of the universities, FAO, and U. S. Operations Mission. A few members of the Turkish Armed Forces Nutrition Institute have received training in the United States. With technical assistance from the ICA, Turkey has established a modern meat packing plant with the supervisors and technicians receiving their training in the United States. Turkey was host to the Second Armed Forces Internation Nutrition Conference in 1958 and the proceedings were published in both Turkish and English.

Korea

The original survey of the Armed Forces had been made in 1953 and in 1956 a new survey was conducted. This revealed there was a marked and measurable improvement in the nutritional status of the troops. Following this finding, a central food service committee was established. There has been considerable improvement in the troop planning and issue system of rations. A food laboratory is actively engaged in the development of emergency field type ration based on indigenous foods. Local gardening and agricultural programs have been instituted; one of the most successful examples is in the work of agricultural extension through the Armed Forces. Improvement in ration planning and distribution has consistently reduced overall cost and at the same time enabled the issue of a better balanced ration. A school for mess officers and cooks has been added to the regular quartermaster training courses. Improvements in nutrition and health in Korea have been outstanding, combining the various systems of education and agriculture, transportation, economics, sanitation and health.

Taiwan

The initial nutrition survey was made in 1954 under the auspices of the United States Army at the request of the Government of China. A new survey was requested and has just been completed. Following the 1954 survey, two rice enrichment plants under the military assistance program were established and have been in continuous operation for the past two years. The Chinese National Armed Forces have a nutrition program well under way, which seems to be of good quality. The Armed Forces furthermore have made a remarkable contribution to the overall food production in Taiwan and provide an agricultural training background for soldiers who will return to civilian life.

Officers at Nutrition Laboratory, Fitzsimons General Hospital, Denver

The Philippines

A nutrition survey was conducted in 1957. In 1959 the ICNND was requested by the Philippine Government and U. S. Operations Mission to supply a nutritionist and food technologist to give further assistance.

The former Philippine Institute of Nutrition has been reorganized so it is now the Food and Nutrition Research Center of the National Sciences and Development Board. The Director of this Center is a member of the newly organized Armed Forces Center Food and Nutrition Board. An active program is in progress with training courses for officers in food service with the instructional staff drawn primarily from the Food

and Nutrition Research Center. This Board has officially recommended that the use of enriched rice in the Armed Forces be mandatory.

Spain

Following the initial survey, the Nutritional Laboratory of the Armed Forces was established in Spain's University of Madrid School of Medicine. The ICNND manual for nutrition surveys was translated into Spanish. Nutrition survey technicians and programs have been extended to the civilian population by the Armed Forces and the Ministry of Health. Spain will be the host for the Fifth Armed Forces Internation Nutrition Conference in 1961 or 1962. The United States was the host for this group in the fall of 1960.

Libya

Progress has been slow but active interest is still maintained by those government officials acquainted with the original survey. Some progress has been made through the follow-up program of the Foreign Agricultural Operations in improving the feeding of school children. Through them, two nutrition education centers for headmasters and school teachers have been established. Over sixty-two Libyan teachers have attended these courses. A book on nutrition for Libyan primary school teachers was written and translated into Arabic. The FAO is greatly encouraged by the progress made.

Ethiopia

Immediately following the initial survey in the fall of 1958, another survey of 6,000 school children was conducted by the counterpart members of the original team. The Medical Advisory Council and the Minister of Health approved and established a Nutrition Council composed of technical and administrative personnel of the government agencies responsible for agriculture and education. A nutrition consultant, acting secretary to the Nutrition Council, is to be assigned for the purpose of integrating nutrition into the programs of the Public Health School at Gondar, and the Agriculture Schools at Jimma and Alemaya, the School of Nursing at Asmara, and the University of Addis Ababa. A nutrition laboratory equipped by the ICNND has been established in the Pasteur Institute. Ethiopian students trained in this country have been well placed in the laboratories in Ethiopia and, as a result of the interest of the Ethiopian students of the University of Wisconsin and Dr. Lester J. Teply, one of the consultants to the ICNND, the Ethiopian Students Association, including nearly 50 students attending colleges and universities in the United States and Canada, has been formed.

Peru

An Armed Forces Institute of Nutrition was promptly established following the survey. The counterpart team members have extended the appraisal of the nutritional status of their armed forces by conducting an excellent survey of an additional 1600 troops in Peru. The Nutrition and Food Control Laboratories of the Armed Forces have been combined in order to pursue an active and encompassing nutrition program.

Ecuador

Sincere interest was expressed by the government officials not only in the survey itself, but in the report issued both to the Minister of Defense and the Minister of Health and Agriculture. Assistance was given by the U. S. Operations Mission, Military Assistance group, the FAO, and the World Health Organization. Laboratory equipment was left in the already established Kellogg Laboratory and progress is being maintained. Inasmuch as this survey was completed less than a year ago, it is too early to state further results.

Chile

The survey was completed just prior to the earthquakes in the spring of 1960. The team was in being at that time and was promptly made available for relief work. A

letter of appreciation was received from the Minister of Defense. This team incorporated a fourth-year medical student from the University of Alabama during an elective period for him. This experiment was most successful and the student was of great help to the team. Inasmuch as the formal report has not yet been returned to Chile, it is too early to state the accomplishments other than the enormous good will created throughout Chile by the team and its warm reception not only by the Minister of Defense and the Armed Forces, but also by the Minister of Health and Public Welfare.

Viet-Nam

The Viet-Nam survey has been completed and report just made to the Government of Viet-Nam. There was excellent cooperation from the President, Minister of Health and Minister of Defense for the U. S. mission.

Colombia

Inasmuch as the report has not been completed, very little can be said as to active accomplishments except that representatives of the ICNND were welcomed by the President personally as well as by the Minister of Defense and the Minister of Public Health and Welfare. Extensive cooperation was given to the team during its work in this country and meetings with the already established Council on Nutrition of Colombia were held and their opinions requested.

Thailand

A survey has just been completed in this country with the initial phases of the report now under study.

Other Points of Note: Accompanying the missions have been representatives of the dental profession and also on some of them, professional photographers in addition to the many amateurs in the teams. As a result, a large collection of teaching slides are available. Movie films have been made of the work in Ethiopia, Ecuador, and Viet-Nam and are available.

ABSTRACT: Biochemical Effects of Dithiazanine on the Canine Whipworm, Trichuris Vulpis.* By Ernest Bueding, M.D., Emil Kmetec, Ph.D., Clyde Swartzwelder, Ph.D., Stanley Abadie and Howard J. Saz. (The full article appears in the Biochemical Pharmacology Journal, Vol. 5, No. 4, February 1961.)

Lactic, acetic, propionic, n-valeric acids, CO_2 and small quantities of formic, and n-butyric acids are products of the aerobic and anaerobic metabolism of adult *Trichuris vulpis*, the canine whipworm. Approximately 50 per cent of the glucose taken up by this parasite is accounted for by these products. The parasite is not dependent on aerobic metabolism. In an atmosphere containing CO_2 (2 to 5 per cent) in nitrogen *Trichuris vulpis* survives *in vitro* for considerably longer periods and metabolizes carbohydrate at a higher rate than in nitrogen alone, in air or in a mixture of CO_2 (5 per cent) and oxygen (20 or 25 per cent).

Dithiazanine, a cyanine dye effective in the treatment of canine and human whipworm infections, in concentrations which do not affect the motility of *Trichuris vulpis*, produces an irreversible inhibition of the glucose uptake by the parasite and a marked reduction in the concentrations of free glucose, of ATP and of the carbohydrate stores in the worm. It is concluded that dithiazanine interferes with the glucose transport in *Trichuris vulpis*. As a result, utilization of endogenous carbohydrate is increased. Depletion of the carbohydrate stores and inability to utilize exogenous glucose brings about a decrease in the generation of energy-rich phosphate bonds. These biochemical changes can account for the chemotherapeutic action of dithiazanine in trichuriasis.

*This study was conducted under the auspices of the Commission on Parasitic Diseases of the Armed Forces Epidemiological Board, and was financially supported by The Surgeon General, Department of the Army.

The Role of the Army Medical Service in "America's People-to-People Program"

By

LIEUTENANT GENERAL LEONARD D. HEATON,
The Surgeon General, U. S. Army

AND

MAJOR GENERAL CARL W. TEMPEL, MC, *U. S. Army,*
Commanding General, Fitzsimons General Hospital

AMERICA'S People-to-People Program, now well into its fifth year of global service, represents an expansion and formal recognition of our country's efforts to build better understanding and friendship abroad. It is based on the assumption, voiced by President Eisenhower when he launched the project in 1956, that "all people want peace."

Through the years, members of our Armed Forces have tried to be friendly and helpful to the countries being assisted by our defense forces. Stress has been placed on the importance of developing good relations with peoples of other lands. Our soldiers, sailors, airmen and marines abroad are increasingly aware of their part in creating understanding between peoples. Our individual efforts in carrying out this program contribute to that which, in the President's words, "is the most worthwhile purpose there is in the world today . . . to help build the road to an enduring peace."

The importance of friendship between peoples of free nations was stressed by the President in September 1957 at Newport, Rhode Island, when he told military officers of twenty-seven friendly nations of the world that "all of us thoroughly believe the people themselves want to be friends and it is as much the duty of professional military officers to enhance and help develop that feeling of friendliness of people as to be capable of defense in case of attack."

Our support of this philosophy of friendship and helpfulness is clearly evident by the many contributions made by Medical Service personnel in foreign countries.

It has become increasingly clear to those who have visited foreign lands that it is not enough to furnish economic and military aid. Our display of friendship and how we personally represent the democratic principles of our free country is extremely important.

Application of this philosophy was revealed to us by past visits to countries in Southeast Asia and more recently on a trip to Europe, the Middle East and Africa. We saw our professional consultants and other advisors from the fields of public health in action with their official health agencies and their military forces through the Military Assistance Advisory Groups (MAAG). It was a very rewarding and gratifying experience to see this aspect of the People-to-People Program in those areas.

Army Medical Service work of this type and the statistical information obtained by health surveys furnishes the Office of the Army Surgeon General and the Department of the Army with data to plan protection for our troops and other Americans abroad. In addition, it affords us a fine opportunity to assist our allies through MAAG and civilian advisory agencies.

Our country takes the position that assistance rendered to free nations of the world strengthens the outposts against world communism. Economic and military aid is important, but medical assistance to improve the health of our loyal neighbors is readily recognized by them and offers a strong bridge to better understanding and a secure route to greater appreciation of our sincere intentions.

Members of the Army Medical Service

have received many letters and certificates of appreciation from those countries where our advisors are assisting in the field of health and welfare. These expressions of thanks and goodwill are important to all of us. The value of the assistance we have rendered in the name of humanity cannot be measured.

We are all familiar with the fact that our Army in Korea helped build schools, orphanages, hospitals, and other public buildings. Even today, our Army medical units take care of many civilian families; military personnel continue to help support the Pusan Orphanage and the Children's Charity Hospital. These are but a few of the acts of kindness that may be cited to illustrate our good neighbor policy in action.

We in the Army Medical Service feel that American medicine can do much more to improve our relations with the free nations of the world, particularly in the underdeveloped countries. Having our defense forces in many parts of the world gives us many opportunities to be of service. That we have not been found wanting is best illustrated by a review of specific contributions to the free world health program:

a. Medical specialists assigned to duty in countries in which a contribution could be made to the local health program have been encouraged to visit and work with such local health officials. The local medical people included private practitioners as well as the military and civilian health agencies. Contacts with these groups were extremely important and many of our physicians accepted a responsibility in this field. Health surveys, demonstrations of operative techniques, lectures at local medical schools, and voluntary consultations were some of the activities encouraged.

b. The Office of the Army Surgeon General has sent military consultant teams as well as individuals highly qualified in the fields of public health, medical care and professional training to serve through MAAG programs in various countries. Funds have been limited for this work; but money has been made available not only from the MAAG units but from the Office of The Surgeon General. Because of the knowledge of local problems by MAAG medical officers and their acquaintance with local medical authorities, a unique opportunity for medical assistance efforts was presented.

c. The Research and Development Command of the Army Medical Service has individuals in various parts of the world making studies on their own initiative and by invitation of the local government for special projects. These have been in such areas of interest as nutrition, cholera, plague and parasitic diseases.

d. The Office of the Army Surgeon General's Preventive Medicine Division has sent officers and teams of specialists abroad to evaluate local public health programs, make recommendations, and participate in training programs.

e. Medical interns from various foreign countries, notably Japan and in Europe, have been assigned to Army Medical Service facilities overseas for training.

f. Medical officers from allied nations have been assigned to various hospitals and Army Medical Service Schools in the Continental United States for training purposes. Many fine friendships have been established between our Medical Service officers and the officers from allied nations; these have been maintained over the years through correspondence and personal contact.

g. Civilian consultants to the Army Surgeon General when sent overseas have been encouraged to visit local medical authorities, not only lecturing at medical schools, but working closely with local health officials.

h. Army medical officers participate in international medical meetings and with such World Health Organization (WHO) activities as the World Health Citizen Committee. The Armed Forces Institute of Pathology has established an International Tumor Center under the auspices of WHO to advance diagnosis, education and training in this field. The institute has also published numerous books on tumor pathology which have been distributed throughout the world.

These authoritative volumes have received wide acclaim and reflect great credit on American medicine, both military and civilian.

i. The Army Medical Service stands ready to render medical service at all times for countries suffering major disasters. The Chilean and Moroccan earthquakes and typhoons in the Orient wrought distress to which our Army responded instantly.

j. Medical care has been furnished for certain foreign personnel both overseas and in the United States by medical officers of our defense forces.

k. The Army Surgeon General's Office maintains a Foreign Liaison Office to handle visits of military medical leaders of foreign nations as well as other dignitaries from abroad, and render other services in the field of medicine to allied nations.

These are some of the areas in which the Army Medical Service has made real contributions to world medicine. Many other contributions have not been mentioned. Improvements in all these services are important and desirable. Any ideas for improvements and for contributions to make our relation with the free world better through the Army Medical Service are welcomed. This is a real challenge to all medical personnel throughout the world for there can be no substitute for human beings working together to relieve human suffering and to bring mankind to a higher level of individual dignity.

Both as Americans and as members of the Army Medical Service, we can do much more to make the People-to-People Program a living organism. In making our contribution, we realize that each nation has its own cultural heritage and its own individual preferences. It is apparent to us that enduring peace does not demand the collectivism in thought and deed of which the communists are so fond. Friendship does not order a deadly sameness among all peoples. Just as the fingers of the hand work for a common purpose, so also can nations and their peoples work for the betterment of all mankind.

In offering our medical skills and by exchanging ideas we can surely receive more than we give. For in an atmosphere of peace, in an environment of friendship and understanding, we can learn as a nation and enrich our lives as individuals.

In a world grown small, Americans are convinced that neither man nor nation can live and thrive alone. "It is impossible," said President Eisenhower, "to be secure in our freedom unless, elsewhere in the world, we help to build the conditions under which freedom can flourish, by destroying conditions under which totalitarianism grows—poverty, illiteracy, hunger and disease. Nor can we hope for enduring peace until the spiritual aspirations of mankind for liberty and opportunity and growth are recognized."

Activities of the Commission on Parasitic Diseases, AFEB*

By
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Armed Forces Epidemiological Board

THE Commission on Parasitic Diseases focuses its attention on problems related to the prevention of tropical or parasitic diseases considered of greatest importance to the military, particularly in its installations in tropical areas. The Commission, sensitive to the diminution in interest, research and teaching in the fields of tropical medicine during peace time, has taken the position with concurrence of the military that it must foster research in the diagnosis, treatment, prevention and control of those diseases which might confront the military should large scale operations become necessary in predominantly tropical areas of the world. This was the basis of the activation of an *AD HOC* Committee on Malaria. The Members, with representation from the Military and Consultant experts, formulated, following a series of meetings, a program designed to assist the military in its malaria research and, at the same time, resulted in the establishment of a number of contracts whereby additional research was started at several research centers.

The composition of the Commission is such that it has representation in the major fields of investigative work and in clinical areas in parasitic diseases. Fortunately, the members of the Commission in the course of other activities travel extensively and the Commission has had the benefit of detailed reports of activities in the Field and in research institutions from practically all parts of the world. The Commission has been instrumental in stimulating a study of the research needs and training opportunities in tropical medicine in this country.

Within the scope of activity of the Commission has been the revision or preparation of technical bulletins dealing with the most important parasitic and tropical diseases which may confront the military forces, not only in war, but in peace time as well. It has furnished consultation or assistance on request to the armed forces in relation to a given epidemiological problem. For example, a sub-committee of the Commission concerned itself with the possibility of the occurrence of Hydatid disease amongst military personnel stationed in the Arctic Command. This sub-committee conducted field investigations and on the basis of their observations and laboratory studies were able to provide a reassuring report.

Laboratory research is undertaken by Commission members or on their recommendation by contract with other research groups. The subjects have ranged from such fundamental studies as those dealing with enzymatic aspects of carbohydrate metabolism in *Ascaris lumbricoides* to applied clinical problems such as the evaluation of antihelminthic agents and their mode of action. Additional examples of laboratory research undertaken by Commission members deal with: visceral larva migrans in relation to tropical eosinophilia; the mechanism of the antihelminthic action of dithiazanine; studies on inhibition of penetration of schistosome cercariae; various studies of the biology of snails related to schistosomiasis and factors influencing the susceptibility and immunity of mosquitoes to infection by malaria.

* See "The Armed Forces Epidemiological Board" by Colonel John Rizzolo, *Military Medicine*, 125: 809, Dec. 1960.

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The Commission has as its chief aim progress in the maintenance of high preventive health standards for the military, particularly in those areas in the tropics where hazards from parasitism or other causes may significantly contribute to poor health or ineffective military strength. It also feels it is desirable that interest in the fields of tropical medicine should be maintained at all times and opportunities should be provided for teaching and research in military and civilian institutions. It welcomes suggestions for fields of investigation and requests for assistance in the study of parasitic diseases wherever these may occur.

The present activities and stability of the Commission owe its progress and present program to the efforts of organization and orientation to its original Director Dr. T. H. Weller and his successor Dr. G. Dammin. The latter is presently the President of The Armed Forces Epidemiological Board.

ABSTRACT: STUDIES OF THE PATHOGENESIS OF STAPHYLOCOCCAL INFECTIONS.

Studies* have been done in collaboration with Dr. Keiichi Goshi and Dr. Joseph E. Johnson III, in the laboratories of the Department of Medicine of the Johns Hopkins University School of Medicine, on immunity to experimental staphylococcal infection, and it has been found in certain types of staphylococcal infection in rabbits that immunity to a toxin of the staphylococcus results in protection against infection. Immunity could be induced by active immunization with the toxin, or by passive transfer of serum from an immune animal to a normal recipient.

Third degree burns in rabbit skin were found to be very susceptible to infection by pathogenic staphylococci or staphylococci derived from human infections. The infection of third degree burns in rabbits were characterized by extensive tissue destruction, hemorrhage, and pus formation. Following recovery from such infections in burns, rabbits were found to be immune to subsequent infection in burned areas. This immunity was correlated with the level of serum antibody to the toxin of the staphylococcus. Subsequent experiments have shown that rabbits immunized with the toxin were protected against infection by staphylococci in burned tissues.

The possible implication of these findings as a means of providing protection against staphylococcal infection in certain instances in man is presently being explored.

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* These studies, which were conducted under the auspices of the Armed Forces Epidemiological Board's Commission on Streptococcal and Staphylococcal Infections, and supported in part by the Surgeon General, Department of the Army, are published in the February 1961 issue of *The Journal of Experimental Medicine*, Volume 113, No. 2, under the following titles:

"Studies of the Pathogenesis of Staphylococcal Infections
I. The Effect of Repeated Skin Infections
II. The Effect of Non-Specific Inflammation
III. The Effect of Tissue Necrosis and Antitoxin Immunity."

Prevention of Heat Casualties in Marine Corps Recruits*

Period of 1955-60, With Comparative Incidence Rates And Climatic Heat Stresses in Other Training Categories

By

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(With ten illustrations)

INTRODUCTION

HEAT stress imposed on military trainees by a combination of hot weather and strenuous drills caused nearly two hundred deaths from heat stroke in recruits at training centers within the United States during World War II.

An epidemiologic analysis by Schickele[1] of 157 of these fatal heat stroke cases in Army recruits indicated that the individual chiefly of risk was an obese unseasoned recruit from a home in the northern United States undergoing his first weeks of summer training at a military base in the South.

In the years since World War II heat illness has continued to be a problem in recruit training. During the summer of 1952 there were approximately 600 heat casualties chiefly from heat exhaustion at the Marine Corps Recruit Depot (MCRD), Parris Island, S.C., with a mean weekly incidence rate of 53 per 10,000 for each of the thirteen weeks from 1 June to 31 August. Cases in Parris Island recruits represented two-thirds of all heat casualties reported in the Navy and Marine Corps for 1952. Four recruits died from heat stroke during the three year period of 1951-1953.

Epidemiologic factors contributing to the risk of heat illness include those relating to climatic heat (Agent), to the recruit (Host), and to the training center and its program (Environment). Recent reports have defined some of these factors as they apply to the occurrence of heat casualties in military training populations of the United States Army[2,3] and the Marine Corps.[4,5,6] The principle of multiple causation of heat casualties must be recognized if effective preventive measures are to be devised. Guidance for training commands in establishing sound hot weather training practices is now available in technical publications.[7,8]

The purpose of this report is to describe in brief the program for preventing heat casualties which is in effect at MCRD, Parris Island, S.C. First adopted in 1954 and later modified in 1956 to include a new index of environmental heat stress, the present program has resulted in a five to tenfold reduction in the seasonal incidence in heat casualties when mean rates for 1956-60 are compared with 1952-53. Comparison will be also made with incidence rates and climatic heat stresses in other categories of Marine Corps trainees.

AGENT FACTORS

Since 1954, training activity at Parris Island has been regulated by a "flag policy" which curtails active drill and physical conditioning exercises during periods of excessive heat.

Temperature-Humidity Index: In 1954 and 1955 a yellow flag was flown at sites near the drill field and rifle range when the air temperature at these sites was 90°F. or above but less than 100°F. with humidity below specified levels. During yellow flag conditions, strenuous drills were curtailed but modified

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training continued. When the air temperature reached 100°F. or when temperatures at 90°F. or above were accompanied by high humidity (e.g. 90°F. and 70% R.H.; 95°F. and 50% R.H., 99°F. and 34% R.H.), a red flag was flown. This was a signal to suspend all active training. Instruction continued but was of the type which could be conducted with recruits standing or sitting in the shade. These regulations applied to all recruits regardless of their previous weeks of training.

Wet Bulb-Globe Temperature (WBGT) Index of Yaglou: In 1954 the Navy Bureau of Medicine and Surgery evaluated a new index of climatic heat stress, called the Wet Bulb-Globe Temperature Index (WBGT),[9] which takes into account not only *temperature* and *humidity* but *thermal radiation* and *air movement* as well. Field studies were conducted on squad or platoon-size groups of Marine trainees (Platoon Leader Candidates) undertaking various infantry training exercises during a six-week summer training program at Marine Corps Schools (MCS), Quantico, Va.[4,6]

Evaporative sweat rate was measured by change in clothed weight of subjects undertaking 27 training exercises while exposed to different combinations of air temperature, humidity, solar radiation, and wind velocity. Sweating, which was used in this study as a measure of environmental heat stress, was found to correlate well with the WBGT Index being tested (Fig. 1). These data, which first appeared in earlier reports[4,6] have been expanded to include the Corrected Effective Temperature (CET) Index of Bedford.[10] In Figure 1, the WBGT Index is seen to rank well ahead of indices based on a single measurement, such as dry bulb or wet bulb temperature. It is also a better index of heat stress than standard Effective Temperature (E.T.)[11] which, in fact, has been successfully applied as a guide in regulating training in hot weather.[12] The wet bulb temperature, which Haldane first suggested as an index of heat stress,[13] has also been used as a guide in regulating hot weather training as reported by Borden, Waddell and Grier.[14] Training was curtailed during periods of high wet bulb temperatures, the cut off point being at lower levels when wind velocity was low and dry bulb temperatures were high. Although the wet bulb temperature may correlate well with the incidence of heat casualties in more humid summer climates such as exist in the gulf states, nevertheless under conditions of high solar radiation and relatively low humidity prevailing in Virginia during the summer, wet bulb temperature is a relatively poor index of heat stress. In this climate globe temerature alone would be the best index of any based on a single reading. However, for use

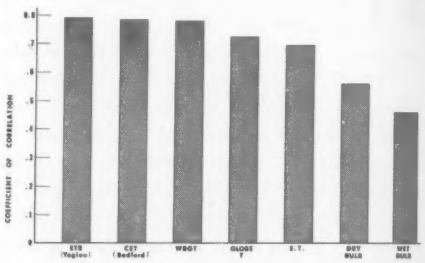

FIG. 1. Correlation between evaporative sweat rate and heat stress indices. 27 training exercises, MCS, Quantico, Va. July-August 1954.

in both hot-dry and hot-humid climates with varying levels of wind and solar radiation a heat stress index must include all four variables contributing to environmental heat.

Both the CET of Bedford and the Effective Temperature including Radiation (ETR) of Yaglou[6] which are based on all four variables are seen in Figure 1 to be slightly but not significantly higher in their correlation with sweating than the WBGT Index. Both of the former two, however, require direct measurement of air velocity for which special instruments in the hands of trained technicians are essential. The WBGT Index, on the contrary, requires no direct measurement of air velocity although wind is evaluated indirectly as indicated below. Any person capable of reading an ordinary thermometer can take the three readings and make the simple calculation.

The WBGT Index is based on readings of three instruments:

1. The *shade dry bulb thermometer* is an ordinary thermometer which reads air temperature.

2. The *natural wet bulb thermometer* is an ordinary thermometer with a moist wick surrounding the bulb. The wet bulb reading is the same as the dry bulb only when the atmosphere is saturated with water vapor (100 percent relative humidity). As relative humidity decreases, an increasing depression of the wet bulb below the dry bulb reading occurs as a result of evaporative cooling of the wet bulb. A natural wet bulb is one which is cooled by natural convection and is exposed to the sun. Under calm conditions its reading will be one or two degrees higher than a shaded wet bulb or a wet bulb reading obtained by sling psychrometer.

3. The *globe thermometer* is a hollow copper sphere six inches in diameter painted matte black on the outside and provided with an ordinary thermometer inserted through an airtight stopper with the stem exposed for reading. The black surface absorbs incident radiation from the sun as well as from surfaces in the environment which exceed the globe surface in temperature. It loses heat to the cooler air by convection and to cooler surfaces by radiation. In an unshaded outdoor position the globe reading is normally above the dry bulb reading. Daytime readings 20°F. or more above air temperature are observed under calm clear conditions. Either a decrease in radiant heat load such as occurs when clouds obscure the sun, or an increase in wind velocity or both will lower the globe reading. Since the reading is a balance between heat gained by radiation and heat lost by convection, the globe in effect integrates radiation, air movement, and air temperature. Thus the combination of globe temperature and wet bulb temperature takes into account all four physical variables of the thermal environment.

The WBGT Index is calculated using the following formula: .7 natural wet bulb temperature + .2 black globe temperature + .1 dry bulb temperature.

Yaglou found this formula to yield a figure differing only slightly from the ETR value calculated with a globe reading corrected for reflectivity of military clothing.* An alternative formula for the WBGT Index is the following (4): .7 psychrometric wet bulb + .3 black globe temperature.

In 1956 the WBGT Index was adopted by the Training Command at Parris Island to replace the temperature-humidity index previously employed. Figure 2 is a diagram of the type of instrument station now in use at Parris Island. Not shown is a small instrument shelter which houses the dry bulb thermometer. This is immediately adjacent and to the left of the upright which supports the globe and natural wet bulb thermometers. For record purposes, readings are also taken on a shaded wet bulb thermometer housed in the same shelter. Readings on all four instruments are taken hourly during summer months from 0800 to 1700. From 1955 through 1959 instrument stations were also set up at Marine Corps Base (MCB), Camp Lejeune, North Carolina, and at MSC, Quantico, Virginia.

From 1 June to 31 August 1959 an instrument station was operated at MCB, 29 Palms, California, to test the validity of the WBGT Index as a measure of heat stress in desert climates. Consideration of heat casualty rates and measurements of heat strain (heart rate, body temperature, and sweat rate) in unacclimatized reserves during a field exercise (Operation Handyman, 24-26 August 1959) indicated that the WBGT Index is applicable to the evaluation of heat stress under conditions of desert heat. The temperature-humidity index, on the other hand, cannot be applied in a dry climate because it grossly overestimates the importance of air temperature. At 29 Palms, for example, temperatures up to 100°F. and over can be tolerated with ease at the low humidities which usually prevail. The

* The formula for correcting the black globe reading for reflectivity of military clothing was misprinted in reference (6). The correct formula is: Globe T. (corrected for clothing reflectivity) = .74 × .95 (tg-ta) + ta, where tg is the black globe reading and ta is the shade air temperature reading.

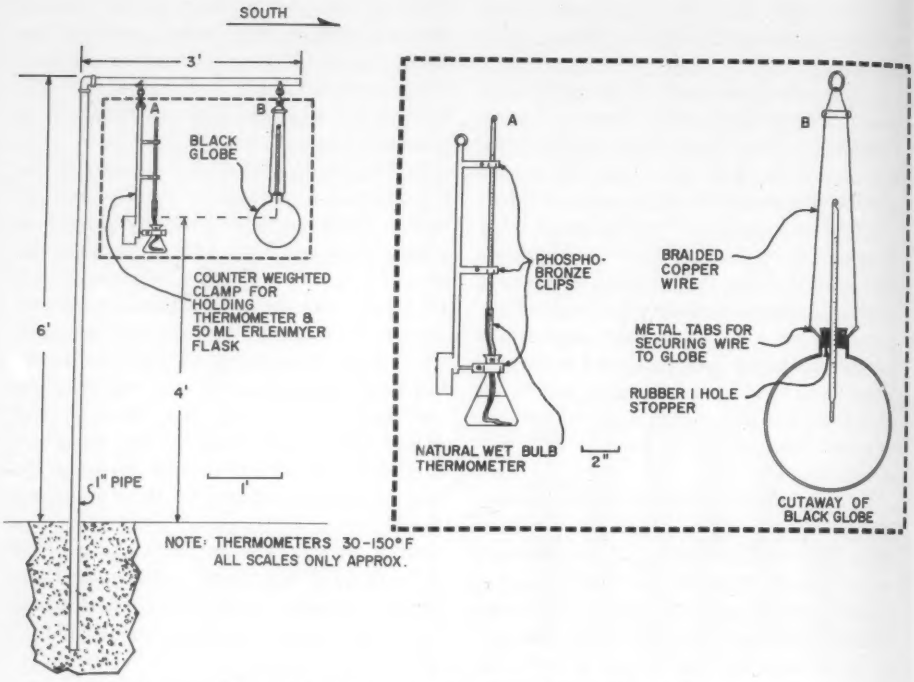

FIG. 2. Wet Bulb-Globe Temperature Instrument Set-Up.

1959 study showed that the seasonal heat stress level during the working day at 29 Palms when evaluated by the WBGT Index was actually less than at Parris Island during the same summer season.

The Army Environmental Health Laboratory[15] has designed and begun to test a portable instrument station for obtaining the WBGT Index. This should prove useful in a training area which might differ significantly in its microclimate from that near a central fixed installation. A necessary precaution in using such a portable station is to allow at least 30 minutes in each new location for permitting the globe to come into equilibrium. Moreover, shade must be provided for the dry bulb thermometer.

Host Factors

Acclimatization. Unseasoned trainees, either recruits or reserves, constitute the groups within a military population most susceptible to heat. Under the present hot weather Standard Operating Procedure (SOP) at Parris Island, the need for greater protection for unseasoned recruits is recognized by the following two innovations in regulations:

1. Modification in Flag Policy. *The Yellow flag* is raised when the WBGT Index is in the range from 85 to 87.9. At these levels of heat stress unacclimatized trainees engaged in strenuous or sustained drills will show an increasingly high incidence of heat casualties.[4,6] Hence, active drill is curtailed for recruits in the forming period and during the first three weeks of training. Instruction is continued but with the recruits sitting or standing in the shade.

More seasoned recruits continue routine training until the WBGT Index reaches 88 or higher. A *Red Flag* is then flown which signals the suspension of active training exercises for all recruits.

Since 1958 a *Green flag* has been raised to

indicate marginal conditions with WBGT levels from 82 to 84.9. Although training is not affected, drill instructors are thereby warned to be on the alert for signs of excessive heat strain in unacclimatized recruits.

2. Breaking-in period. During the forming period and first week of training, there is a gradual increase in duration and intensity of conditioning exercises and infantry drill. Strenuous exercises including the obstacle course and bayonet course are scheduled for the last three weeks of training.

Physical fitness. Since 1956 there has been increasing emphasis on physical fitness. Physical conditioning is second only to infantry drill in terms of hours assigned for these exercises. Each recruit is evaluated by a strength test (Army Field Manual 21-20, Chap. 17) once, before he begins training, and twice subsequently. An obese recruit or one substandard in physical fitness is assigned to a special conditioning platoon. When fulfilling requirements of body weight reduction and demonstrating his ability to pass the strength test, he is returned to a regular training platoon. A high level of physical fitness is second in importance only to heat acclimatization itself in promoting tolerance to climatic heat stress.

Water. The discredited dogma of water discipline has been replaced by the physiologically sound principle of water freedom. The recruit carries a full canteen into the field and is encouraged to drink at frequent intervals in amounts sufficient to slightly more than satisfy his thirst.

Salt. Although the symptom of muscle cramps indicating salt deficiency has not been common in association with the syndrome of heat exhaustion as seen at Parris Island, nevertheless as a preventive measure the unacclimatized recruit is instructed to add extra salt to his food at mealtime. During periods of excessive heat he is required to take additional salt in the form of two cellulose impregnated salt tablets (.6 gram each) after every meal.

Clothing. In 1954 a rational policy of hot weather clothing was adopted permitting utility trousers to be worn outside the boots and requiring that the utility jacket be replaced by the khaki shirt during flag weather. Helmet liners were worn in place of utility caps. In 1958 a further modification in clothing policy was introduced. This regulation specifies the wearing of the T-shirt as the only garment of the upper torso when the hot weather SOP is in effect. Precautions are taken to prevent sunburn, particularly in fair skinned recruits. The wearing of the T-shirt in hot weather has received enthusiastic acceptance by recruits, training officers, and the depot medical department. This recent change in the hot weather uniform has unquestionably reduced effects of environmental heat by promoting more efficient evaporative and convective cooling of the body.

Immunizing inoculations. Recruits experiencing febrile reactions to inoculations are more susceptible to effects of heat stress. Since 1957 recruits receiving inoculations are placed on a light duty status the following day.

Environmental Factors

Factors in the environment of the training camp other than the climate may intensify or diminish the impact of heat on a susceptible host. Field studies in 1955[5] measured the metabolic heat production in recruits during various training exercises and estimates were made of the total energy requirement for the training day. Twenty four hour sweat rates were also measured. These measurements are indicative of the degree of physiological strain to which the recruit is exposed.

Training schedule. It is standard practice to allow a ten minute rest period during each hour of active training, thus avoiding to some extent the cumulative effects of exercise in the heat. However, when the hot weather SOP is in effect, sustained exercises such as training marches are scheduled at night or in the early morning before heat conditions have reached WBGT levels of 80 or above. Training marches conducted at WBGT levels of 80 or above have been responsible for a number of severe casualties, particularly in unseasoned trainees.

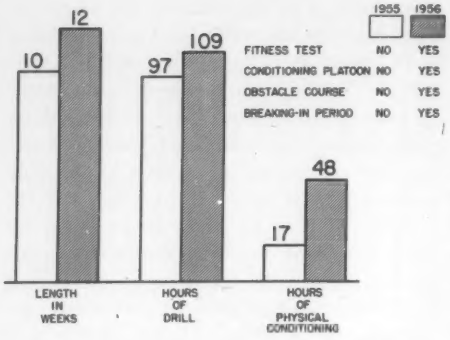

FIG. 3. Changes in Training Program 1955-1956. MCRD Parris Island.

Classrooms. In 1954 a significant number of heat casualties at MCS, Quantico, occurred in outdoor classrooms in which students were exposed to sun but shielded from wind. Outdoor classes should be conducted in the shade. At Parris Island new buildings have been constructed which provide mechanical cooling for indoor classes.

Meals. Postprandial exercise in the heat leads to competitive demands on the circulation by the digestive tract, active muscle, and the skin. Heat imbalance, digestive disturbances, and circulatory strain may result. Meals should be followed by a one-hour rest period or classroom instruction. The large meal of the day should be scheduled for the evening.

Sleep. Seven hours of sleep prevents cumulative effects of fatigue resulting from long hours of strenuous training. To ensure restful sleep, the barracks must be properly ventilated. Excessive heat at night leads to heat rash which in turn can lead to more serious disturbances in body temperature regulation. Newly constructed barracks at Parris Island have ventilation systems designed to prevent build-up of heat during the day and to allow prompt cooling inside the squad bays as outside temperatures fall at sundown.

Leadership and Indoctrination. Since 1954 active support by the Recruit Training Command at MCRD, Parris Island, has been a key element in the success of the program for preventing heat casualties. All training officers and drill instructors are indoctrinated by medical officers of the depot medical department in the principles underlying the hot weather SOP.

A recent training aid which is shown to all drill instructors is a Navy Training Film MN 8965 entitled "Prevention of Heat Casualties." This was filmed in color at Parris Island in 1959 and portrays the important elements in the hot weather SOP including the application of the WBGT Index in regulating training.

RESULTS

The program for preventing heat casualties first adopted at Parris Island in 1954 and continued through 1955 resulted in a striking reduction in heat casualties but this was achieved at considerable cost in daytime hours scheduled for drill periods. The present program was adopted in 1956 and has undergone only minor changes since. The principal changes introduced in 1956 are shown in Figure 3 and Table I.

Therefore a comparison of 1956 with 1955 becomes of interest with respect to summer heat and the incidence of heat casualties. Detailed reports of these studies have appeared elsewhere.[16,17] Hence, only a summary of the more significant findings will be presented here.

From 1955 to the present time summer weather conditions at Parris Island have been recorded hourly from 0800 to 1700 at instrument stations (see Fig. 2) located at the edge of the drill field and near the rifle range. Pertinent data on each heat casualty is recorded on a special form by the medical officer who has established the diagnosis. These reports are submitted to the Navy Bureau of Medicine and Surgery each month during the reporting period.

Similar data have been obtained from two other Marine Corps bases on the east coast from 1955 through 1959 and from MCB, 29 Palms, in the California desert in 1959.

Statistical evaluation of weather data indicates that the summer of 1956 at Parris Is-

TABLE 1
CHANGES IN HOT WEATHER REGULATIONS
MCRD PARRIS ISLAND

	1955	1956
HEAT STRESS INDEX	TEMPERATURE and HUMIDITY	WBGT INDEX .7 WET BULB .1 DRY BULB .2 GLOBE TEMP.
YELLOW FLAG	90-100° DRY BULB LOW HUMIDITY	85-87.9
RED FLAG	90-100° DRY BULB HIGH HUMIDITY OR D.B. OVER 100°	88 AND OVER
RECRUITS AFFECTED	YELLOW AND RED FLAGS APPLY TO ALL RECRUITS	YELLOW FLAG APPLIES ONLY TO RECRUITS IN FIRST THREE WEEKS OF TRAINING

land was significantly hotter than 1955. There were in fact 44% more hours in the heat stress zone in the summer of 1956 than in the corresponding period of the previous year (Fig. 4). There were, on the other hand, 30% fewer hours of training lost per man (Fig. 5) because in 1956 the lower levels of heat stress (WBGT 85-87.9) applied only to recruits in early weeks of training, a group which constitutes about one third of the total recruit strength.

Despite the higher seasonal heat in 1956, the incidence rate of heat casualties was lower than in the previous year (Fig. 6), the mean weekly rate from 1 June to 31 August being 4.67 per 10,000 recruits in 1956 compared

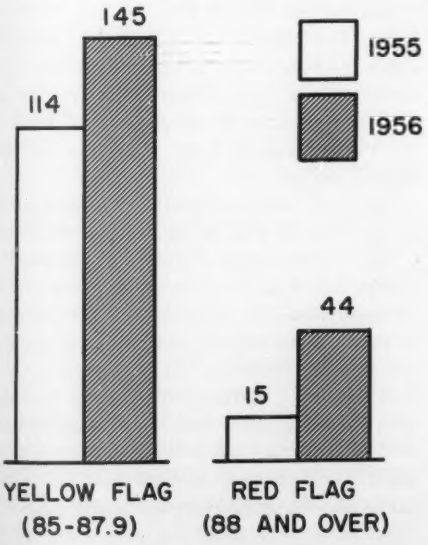

FIG. 4. Heat Stress Hours Basted on WBGT Index. (MCRD Parris Island, S.C., 1 June-31 Aug.)

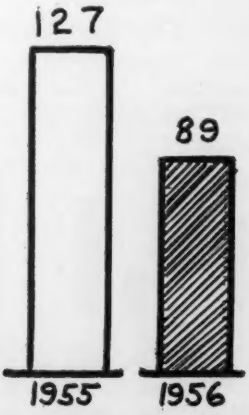

FIG. 5. Potential Hours of Training Lost Per Man. (MCRD Parris Island, S.C., 1 June-31 Aug.)

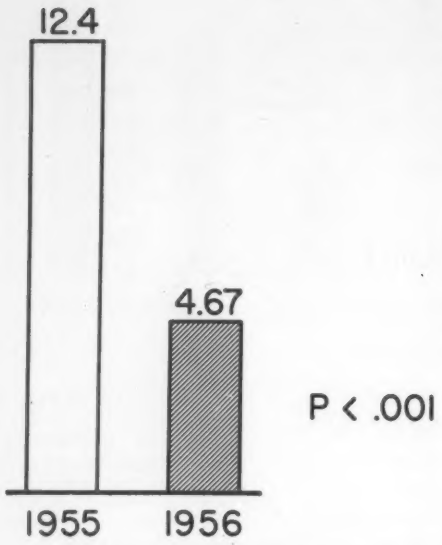

FIG. 6. Mean Weekly Incidence of Heat Casualties per 10,000 Trainees. (MCRD Parris Island, S.C., 1 June-31 Aug.)

with 12.4 in 1955. This difference is statistically significant.

The incidence rate among recruits at Parris Island has remained low since 1956, the mean weekly rate from 1 June to 31 August for the five year period of 1956-1960 is 4.34 (Fig. 7). This differs in a highly significant manner from the rates in recruits at Parris Island in 1952-1953 prior to the adoption of

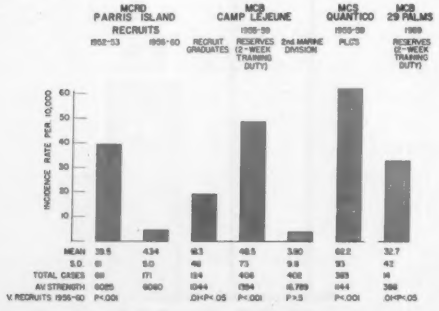

FIG. 7. Mean Weekly Incidence Rate of Heat Casualties at Marine Corps Training Centers. (1 June-31 Aug.)

hot weather training regulations as well as from incidence rates from 1955 through 1959 in reserves on two week training duty at MCB, Camp Lejeune, North Carolina, and Platoon Leader Candidates (PLC's) at MCS, Quantico, Virginia.

Incidence rates in Recruit Graduates, who are assigned to Camp Lejeune for advanced training following completion of recruit training at Parris Island is about one third the rate in the Reserves but higher than in the recruit population at Parris Island. Statistically, however, this latter difference is of borderline significance.

From 1955 through 1959 the highest incidence rate of heat casualties during summer training has occurred among PLC's, MCS, Quantico, Virginia with a mean weekly incidence of 62 per 10,000. Trainees in the PLC program are students in the last two years of college undertaking six weeks of summer training which eventually leads to a commission as second lieutenant.

The incidence rate of heat casualties in Reserves on two week training duty at MCB, 29 Palms, California, from 1 June to 31 August 1959 is higher than in recruits at Parris Island but less than in Reserves at Camp Lejeune. The number of cases is too small to make valid statistical comparisons. The incidence rate in this category, however, is in good agreement with the heat stress level at 29 Palms evaluated on the basis of the WBGT index.

Incidence rates of heat casualties in units of the Second Marine Division stationed at Camp Lejeune were slightly, but not significantly, less than in the recruits. Men in the Division, however, represent hardened troops in an advanced stage of physical conditioning and combat readiness. The majority of the heat casualties in this group were of a minor nature, falling in the category of heat syncope usually occurring while the men were standing in parade formation in the heat. In the recruits and the other groups of trainees, on the other hand, most cases fall in the category of typical heat exhaustion in which dehydration, lack of acclimatization and excessive exertion

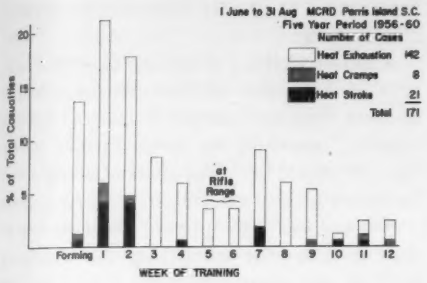

FIG. 8. Distribution of Heat Casualties Based on Week of Training.

in the heat, are the major precipitating factors. A small but important percentage of casualties at Parris Island are cases of heat stroke occurring most often in early weeks of training. The distribution of casualties in recruits based on week of training during the five year period from 1956-1960 is shown in Figure 8.

Weather. Comparative conditions of climatic heat at the four Marine Corps training centers are illustrated in Figure 9. It is evident that Parris Island has a significantly hotter climate than either Camp Lejeune or Quantico. Not only are the wet bulb temperatures higher, but the dry bulb and globe temperatures as well. The mean weekly WBGT during summer months at Parris Island (1955-1959) even exceeds that at 29 Palms during the same season in 1959. At 29 Palms, however, the dry bulb is 10 degrees higher and the globe temperature is 20 degrees higher than at Parris Island whereas the wet bulb temperature is 10 degrees lower. Thus, in the desert, heat stress is related to the high sensible heat load whereas at Parris Island, inefficient evaporation of sweat is the major cause of heat stress. In both climates, however, the WBGT index appears to provide a valid assessment of heat stress.

Heat Stress Hours. A program for preventing heat casualties at military training centers must be acceptable to the training command. Interruption of active drill and exercises during hot weather must therefore be kept to a minimum. Such interruptions

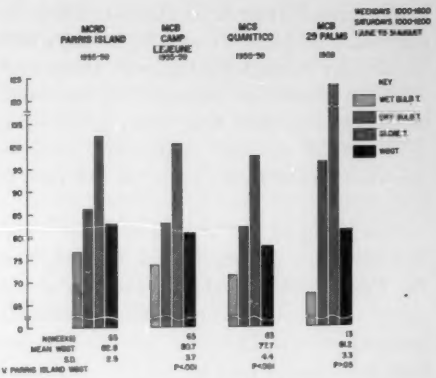

FIG. 9. Mean Weekly Temperatures and WBGT Index at Four Marine Corps Training Centers from Hourly Readings.

are justified only if weather conditions are adjudged by a valid index of climatic heat stress to represent a hazard to the health of the trainees.

Since 1956 only at Parris Island has training been regulated by a flag system based on the WBGT index. Data collected at each of the four Marine Corps training centers from 1955 through 1959, however, make it possible to calculate the percentage of hours of summer training from 1000 through 1600 during which training would have been interrupted by either the yellow flag (WBGT 85-87.9) or the red flag (WBGT 88 and over) if the present hot weather SOP at Parris Island had been in effect at each center. There are considered to be 494 working

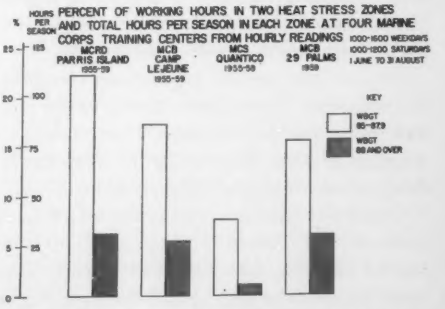

FIG. 10. Percent of Working Hours and Hours Per Season at Four Marine Corps Training Centers.

hours from 1 June to 31 August. These include only the hours from 1000 through 1600 on Monday through Friday and 1000 through 1200 on Saturday. Sundays are excluded. Relatively very few heat stress hours occur before 1000 or after 1600. This analysis therefore encompasses only the hot part of each day.

From Figure 10 it is evident that hot weather training regulations patterned on the Parris Island model interfere to a relatively small extent with training of unacclimatized recruits. In case of seasoned trainees who are affected only by red flag conditions, the percentage of hours during which training is interrupted is even smaller. There will, of course, be heat waves from time to time, particularly in the latter half of July, when the number of flag hours per day or week will considerably exceed the mean percentage. On the other hand there will be several weeks each summer during which the flag will fly only a few hours or not at all.

Discussion

The incidence rate of heat casualties in recruits during summer training at MCRD, Parris Island, S. C. has remained at low levels since 1956 at which time the present summer training regulations were introduced. Training is curtailed at lower heat stress levels for new recruits (WBGT 85-87.9) than for recruits in later weeks of training (WBGT 88 and over). This provides greater protection for those who need it and allows more seasoned recruits to acquire a higher level of heat acclimatization than was possible under regulations in effect before 1956.

Because the present regulations recognize the difference in heat tolerance between new and more seasoned recruits, fewer hours of training are lost than under former regulations which treated all recruits alike.

Other hot weather procedures which have reduced still further the impact of environmental heat on unacclimatized recruits have been the introduction of: a) the breaking-in period; b) conditioning platoons for obese recruits and others substandard in physical fitness; and c) greater emphasis on physical conditioning.

Rational clothing practices, liberal allowance of water and salt, indoctrination in hot weather hygiene and active support by the training command are other factors which have all played key roles in maintaining a low incidence of heat casualties at Parris Island.

The success of the present program is further indicated by comparing the incidence rate of heat casualties in Parris Island recruits with rates in other categories of Marine Corps trainees including those stationed at Camp Lejeune, N. C., Quantico, Va., and 29 Palms, California. Hot weather regulations at these bases have been patterned on those already described for Parris Island in 1955, but in general, were less rigidly enforced. At 29 Palms, enforcement of the temperature-humidity index was in fact not feasible, because air temperature from 1 June to 31 August exceeded prescribed cut-off levels during more than 85% of the working hours.

If one compares summer weather conditions at the four bases and evaluates heat stress by the WBGT index, Parris Island is found to have a hotter climate than the other three including 29 Palms. This again is a strong indication of the effectiveness of the Parris Island program.

The highest rate of heat casualties was found on the other hand to be in Platoon Leader Candidates at MCS, Quantico, Virginia, which enjoys the coolest summer climate of any of the four geographic areas included in this survey. Therefore epidemiologic factors other than climatic heat appear to be playing the dominant role. Examination of case records in this training category reveals that 65% of casualties in the PLC program occurred during daytime hikes and training marches. Eighty-three percent of 223 casualties reported during the summers of 1958 and 1959 occurred in PLC's during the first three weeks of training. Hence, sustained metabolic heat output in incompletely acclimatized trainees appears to be the factor which, combined with environmental heat, leads to excessive heat strain and a high inci-

dence of heat casualties. Regulations based on the present Parris Island model would reduce casualties from this cause.

Although successful in reducing heat casualties to a marked extent during the past five years, the preventive program at Parris Island leaves certain problems unsolved. The first of these is the striking disproportion between the number of heat casualties occurring in early weeks of training compared with later weeks. The distribution of cases is shown in Fig. 8. Sixty-one percent of 171 heat casualties that were reported during the five summer training periods since 1956 occurred in recruits during the forming period and their first three weeks of training. Only six percent occurred during the last three weeks. This suggests the need for increased attention to the recruit who is heat susceptible because he lacks acclimatization. Some additional measure for protection seems indicated such as a more gradual build-up to full training. It might also be desirable to modify training during green flag conditions (WBGT 82-84.9) for recruits in the forming period and during the first two weeks of training. On the other hand recruits in the last three weeks of training demonstrate high levels of heat tolerance. This suggests the possibility of raising the heat stress ceiling during the last quarter.

During the latter weeks of the summer of 1960 a trial study was initiated under which some recruits in this final quarter of training were permitted to continue routine training until the WBGT index reached 90. This is still in the experimental stage and it will be some time before sufficient data are available to evaluate this procedure. Hence it is not to be recommended as a standard regulation in recruit training.

The second problem which remains unsolved is the continued occurrence of heat stroke, the relative rate of which appears to have increased as the incidence rate from milder forms of heat illness has declined. Twenty-one cases of heat stroke have occurred in recruits since 1956. These represent twelve percent of the total casualties. Figure 8 shows that 66% of the heat stroke cases occurred before the third week of training. This again suggests the need for providing greater protection during this early period. Eight cases of heat cramps were reported during the past five summers, four of these occurring within the first two weeks.

There have been no fatal cases among heat casualties at Parris Island since 1953. Prompt diagnosis and early treatment of heat stroke are the factors which have been largely responsible for this excellent record.

Summary and Conclusions

1. The present program for preventing heat casualties in recruits at the Marine Corps Recruit Depot, Parris Island, South Carolina, recognizes the epidemiologic principle that mass diseases result from the interaction of multiple factors. In case of heat casualties in recruits these are related to climatic heat (agent), the trainee (host), and the training center (environment).

2. Climatic heat is evaluated using the Wet-Bulb Globe-Temperature index of Yaglou which is simple to derive and takes into account not only environmental temperature and humidity but radiation and wind as well. The WBGT index has been demonstrated to correlate well with physiological effects of heat stress and can be used in hot dry conditions of the desert as well as in warm humid climates.

3. Training for new recruits is curtailed at lower levels of heat stress than in more seasoned recruits. This procedure has resulted in less loss of training hours than under former regulations which treated all recruits alike.

4. Other important elements in the program are: a breaking-in period; greater emphasis on physical fitness; special conditioning platoons for obese recruits and others substandard in physical fitness; liberal allowance of water and salt; rational clothing practices, and indoctrination of drill instructors and recruits in elements of hot weather hygiene.

5. The incidence rate of heat casualties in recruits at Parris Island dropped signifi-

cantly in 1956 when this program was first adopted, and has remained lower than in four other training categories in the Marine Corps despite the higher levels of heat stress at Parris Island compared with the other training centers.

6. Regulations patterned after those in use at Parris Island would reduce heat casualties in these other training categories without serious interruptions in training schedules.

7. Problems in prevention of heat casualties in recruits which still remain to be solved are the relatively high incidence of casualties in the early weeks of training and the continued occurrence of heat stroke in small but important numbers.

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Effects of Environmental Hyperthermia on Man and Other Mammals: A Review*

By Jehu C. Hunter†

(With four illustrations)

TEMPERATURE variations affect nearly every physical, chemical and biological process. The effect in biological systems is often striking and may have many ramifications. As regards hyperthermia, the heat to which an individual may react may be of external origin or may be generated internally by metabolic processes. As a warm blooded animal normally leads an active life and therefore must eliminate excess heat, hyperthermia may be defined as any factor which renders more difficult normal heat loss. The term, therefore, need not imply the existence of an external temperature above that of the body. The present report will be limited to the comparatively narrow field of the effects of a hot environment on man and other mammals. Although studies on the effects of heat on animals date back to Claude Bernard's lectures on *La Chaleur Animale* published in 1876,[1] this presentation will report findings published in the last decade or so and will include such references as will in turn direct the interested reader to a more extensive coverage of the literature.

Heat Stress and Effective Temperature

According to Bazett,[2] an animal's reaction to hyperthermia varies not only with the temperature difference between the surface of the body and the surrounding air, it is also much affected by the thermal conductivity and capacity of the milieu in contact with the skin, as well as the conductivity of the skin itself. It is obvious, therefore, that effects of hyperthermia on the land animal's physiology will be influenced by other environmental factors such as the movement and moisture content of the surrounding air. In the hot environment, the degree of stress depends upon the combination of air temperature, wind, vapor pressure and radiation.[3] Heat stress may then be defined as the degree of effort required to dissipate the combined metabolic and exogenous heat in order to maintain thermal equilibrium.[4] The dry bulb temperature by itself is an inadequate expression of heat stress imposed by the environment in view of the importance in body temperature regulation of the humidity of the air and air movement. More informative is the effective temperature which takes into account both of these other factors. An even more accurate index is the corrected effective temperature which also considers the radiation temperature (Fig. 1).

"Effective temperature" values have been used by engineers since the early 1920's when the American Society of Heating and Ventilating Engineers started a series of physiological laboratory experiments at the U. S. Bureau of Mines, Pittsburgh, Pennsylvania. From this study of the reactions of human beings under a wide variety of controlled temperature and humidity conditions the Society established "effective temperature" (equal comfort) lines, each of which passes through the pairs of temperature and humidity combinations which gave to the "average" person the same degree of comfort as nearly as could be determined. Each of the effective temperature lines was designated by the dry bulb temperature at 100% relative humidity. For example, the effective temperature line of 90° connects the point 90°F at 100% relative humidity with many other equal comfort com-

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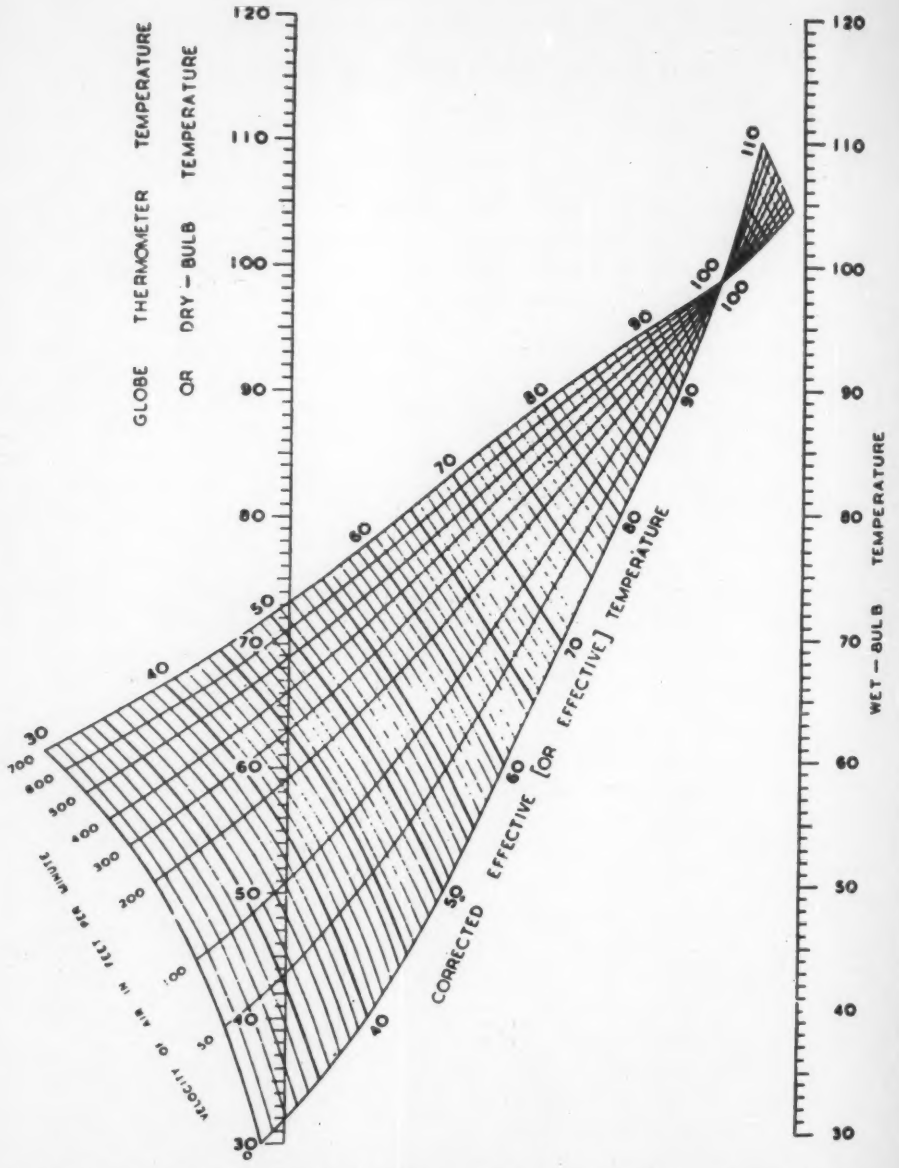


FIG. 1.—Chart showing normal scale of corrected effective (or effective) temperatures (for persons wearing normal clothing).

The right-hand vertical scale represents the wet bulb temperature. The left-hand scale represents the globe thermometer temperature, or the air temperature, according to whether one is determining the corrected effective temperature or the effective temperature.

The sloping grid consists of a series of curves each of which is a scale of corrected effective (or effective) temperature corresponding to the air velocity shown at the lower end of the curve. Lines are drawn through points on the different curves representing identical corrected effective (or effective) temperatures, so that values for intermediate air velocities can be accurately read.—(From *Environmental Warmth and its Measurement*. Bedford, 1946. By permission of H.M.S.O.)

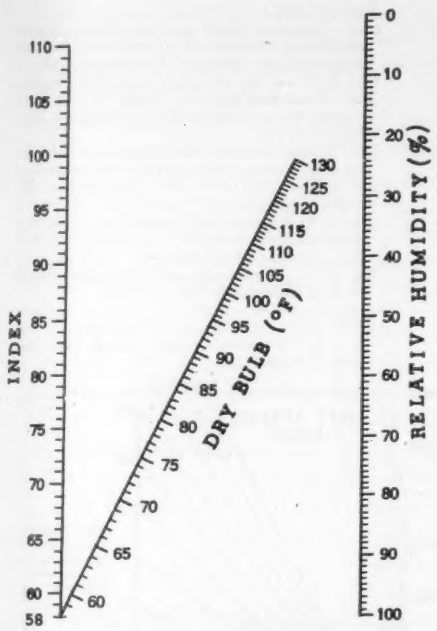


FIG. 2. Straight Line Nomogram for Determining Temperature-Humidity Index From the Dry-Bulb Temperature and the Relative Humidity. (At temperatures 58° and below, use the index as numerically equal to the dry-bulb temperature.)

binations, including 95°F at 77% r.h., 100°F at 58% r.h., 105°F at 43% r.h., and so forth.[5] Using a straight edge to connect the dry bulb and wet bulb temperatures, the effective temperature at different air speeds can be read directly from the central sloping grid in the nomogram in Figure 1. For example, given a dry bulb temperature of 80°F and a wet bulb temperature of 69°F the effective temperature at 0 ft/min is 74° and at 700 ft/min is 61°. While the air velocity scale of the effective temperature nomogram in Figure 1 is in feet per minute (FPM) the air velocity in miles per hour (MPH) can be obtained easily:

$$\frac{\text{FPM} \times 60}{5280} = \text{MPH}$$

FPM × 60 yields feet per hour and 5280 is the number of feet in one mile. Straight line nomograms for determining the temperature-humidity index (effective temperature) have been prepared by the U. S. Weather Bureau. With these nomograms, effective temperature can be determined for an environment with a minimum of air movement. One nomogram

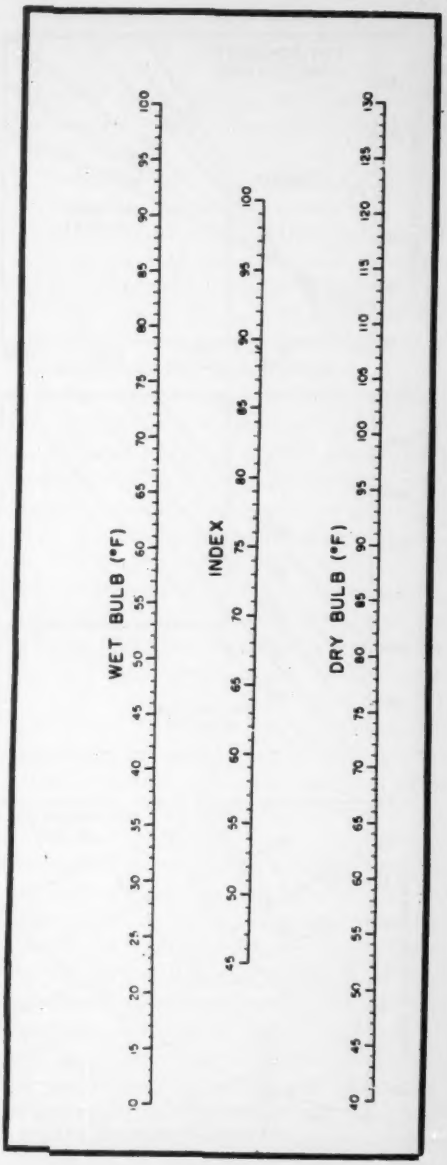
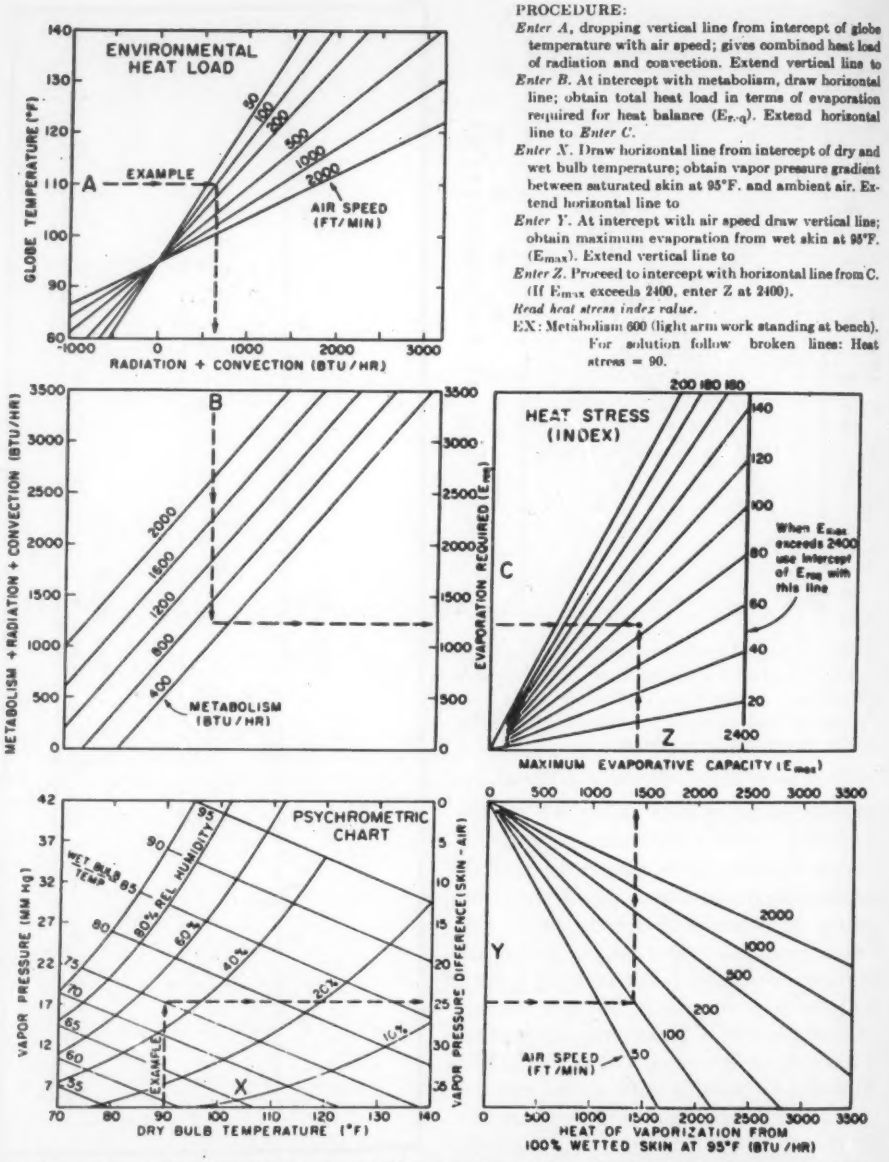


FIG. 3. Straight Line Nomogram for Securing the Temperature-Humidity Index from the Dry-Bulb and Wet-Bulb Temperatures. (U.S. Department of Commerce)



PROCEDURE:

Enter A, dropping vertical line from intercept of globe temperature with air speed; gives combined heat load of radiation and convection. Extend vertical line to

Enter B. At intercept with metabolism, draw horizontal line; obtain total heat load in terms of evaporation required for heat balance ($E_{r\text{-}q}$). Extend horizontal line to *Enter C*.

Enter X. Draw horizontal line from intercept of dry and wet bulb temperature; obtain vapor pressure gradient between saturated skin at 95°F. and ambient air. Extend horizontal line to

Enter Y. At intercept with air speed draw vertical line; obtain maximum evaporation from wet skin at 95°F. (E_{max}). Extend vertical line to

Enter Z. Proceed to intercept with horizontal line from C. (If E_{max} exceeds 2400, enter Z at 2400).

Read heat stress index value.

EX: Metabolism 600 (light arm work standing at bench). For solution follow broken lines: Heat stress = 90.

This index represents a rational approach to evaluation of heat stress in terms of: *1*. thermal load which is imposed on a standard man; *2*. capacity of the environment to accept the load; and *3*. physiological capacity to meet the demands over a period of 8 hours.

The standard man represents a composite of young, fit, acclimatized men who have been subjects of physiological investigation of the effects of heat in the laboratory and in the field.

FIG. 4. Flow charts for determining heat stress index values. Example: globe 110, dry bulb 90, wet bulb 75, air speed 100, metabolism 600. For solution, follow broken lines: Heat stress = 90. (From Belding and Hatch[6])

determines the effective temperature from the dry bulb temperature and the relative humidity; the other uses the dry bulb and dew point temperatures (Figs. 2 and 3).

Belding and Hatch[6] have devised flow charts for determining heat stress index values (Fig. 4). This system evaluates heat stress in terms of thermal load which is imposed on a "standard" man, capacity of the environment to accept the load, and physiological capacity to meet the demands over a period of 8 hours.

Physiological Defense Against Heat Stress

Selye in his comprehensive writings on stress[7] devotes considerable space to the role of the endocrine system in the defense of the organism against noxious stimuli. Particularly involved are the hypophysis, adrenals, and hypothalamus. According to Selye, increase in adrenocorticotrophic hormone (ACTH) production is the simplest, i.e., most non-specific response to systemic stress.[7]

The release of this pituitary hormone causes an increased discharge of steroid hormones of the adrenal cortex. The hypothalamus integrates somato-motor and viscero-motor activities which are predominantly of a homeostatic nature. Since stress tends to disturb the homeostasis of the organism, the hypothalamus certainly must be involved in the organism's attempt to adapt to systemic stress. Sayers and coworkers[8] believe that there is a connecting link between the hypothalamus and the adenohypophysis which represents "a final common path" for the great variety of stimuli which induce ACTH release. Cortisol, corticosterone and aldosterone are now established as the adrenal secretory products of major biological importance in the dog[9] and in man.[10,11,12] Cortisol accounts in large measure for the action of the adrenocortical secretion on carbohydrate and protein metabolism, aldosterone is in large part responsible for the action of the adrenal cortex on electrolyte metabolism, and corticosterone seems to make a small but significant contribution to both of the major metabolic activities of the adrenal cortex.[8] Indirect evidence suggests that the greatest discharge of corticoids from the adrenal occurs during the alarm phase of the stress syndrome, although overproduction continues throughout the stage of resistance.[7]

In acute stress the organism mobilizes its carbohydrate reserves. Carbohydrate is the most important source of immediately available energy. Both the central nervous system and the muscles are almost entirely dependent upon glucose for the performance of their functions. In contrast to fats and proteins, carbohydrates do not tend to yield toxic metabolites, even if very large amounts are suddenly catabolized. Because of its importance as a source of energy during stress, consideration must be given to the influence of the hypophysis and adrenal cortex on the regulation of glucose metabolism. It was proposed in 1947 by Colowick *et al* that insulin acts to relieve an inhibition of the hexokinase reaction resulting from the mutual action of protein hormones from the anterior pituitary and steroids of the adrenal cortex, although other steroids may be involved.[13] Krahl has reported that the glucose uptake of muscle is in part under an insulin-reversible inhibitory influence from the pituitary and adrenals and in part under an inhibition which persists even when both of these glands are removed.[14] Bornstein and Park[15] have shown that the serum of alloxan-diabetic rats inhibits *in vitro* glucose uptake by the diaphragm of normal fasted rats. The inhibition is reversed *in vitro* by insulin. On the other hand, serum from adrenalectomized or hypophysectomized rats does not inhibit glucose uptake. The lost inhibitory property of the serum of hypophysectomized rats can be restored by injection of growth hormone plus cortisone but not by either substance alone. Further work[16] showed that the inhibitor was associated with a lipoprotein fraction. Woods *et al*[17,18,19] have reported that exposure of mice bearing the S91 melanoma to a high environmental temperature which was lower than or the same as rectal temperature, resulted in an insulin-reversible lowering of tumor glycolysis and

the inhibition of tumor growth. Glucose metabolism of normal tissues (kidney, brain), however, was much more resistant to the effects of temperature stress than was tumor glycolysis.[20] A sex steroid and a steroid-like synthetic hormone, testosterone and diethylstilbestrol, caused an insulin-reversible inhibition of the anaerobic glycolysis of tumor slices *in vitro*.[21] The data presented by these workers show that exposure of the host-tumor system to stressful conditions greatly accentuates the activity of an anti-insulin glycolytic inhibitor mechanism, which appears to operate also in animals in a relatively stress-free environment, though less effectively.

While systemic stress causes the mobilization of the animal's carbohydrate reserves, it also causes rapid breakdown of cytoplasm and even of entire cells.[7] The resulting liberation of protein catabolites furnishes the necessary building blocks for regeneration of tissues. Thus the tissues of the body are temporarily "rejuvenated" by acute systemic stress, but in terms of the whole life span, exposure to stress results in aging, i.e., in the gradual exhaustion of the ability for further regeneration and adaptation. Selye[7] summarizes the characteristic derangement in protein metabolism as follows: "During both the stages of alarm and exhaustion, there is pronounced protein catabolism with loss of tissue-protein reserves. Between these two catabolic periods, during the resistant stage, there is a tendency to replace the tissue protein which was lost during the alarm phase. However, there appears to be no true reversal of the alarm response. The previously negative nitrogen balance becomes positive, but only until the protein reserves are built up to about the normal level; excessive nitrogen storage is exceptional."

Salt and water balance are also affected by systemic stress. There are characteristic changes in the distribution of electrolytes between the cells and the extracellular fluid, changes in osmotic pressure, acid-base balance, kidney function, water balance, etc. All of these are closely interrelated and largely non-specific in nature. Exposure to excessive heat leads to profuse sweating and considerable losses of sodium and chloride through the perspiration.[22,23,24] Because of the simultaneous loss of water and hemoconcentration, this may actually be accompanied by an increase in the sodium chloride concentration of the plasma. However, if excess water is ingested, the plasma concentration of sodium chloride falls.[25] This condition is often accompanied by the so-called "miner's cramps," a derangement in the contractility of the muscle. Sodium chloride losses in heat stroke have been reported by many investigators although apparently they are not always manifest.[26] In any event, prophylactic administration of sodium chloride appears to be indicated.[27,28]

Horne[4] reports that in man the water output of the body in a hot environment depends principally on the amount of sweating required to maintain thermal equilibrium. There is considerable individual variation in sweating-function, but the rate of sweating depends mainly on skin temperature, and extremely high rates (up to 3 or 4 liters per hour) can be achieved for short periods. The sweating-mechanism appears to be fatiguable when extremely high rates are called for, more so in humid than in dry heat. There is great individual variation in the chloride concentration of the sweat, but high rates of sweating always lead to hypochloremia unless the salt is replaced. The studies of Conn[29] demonstrated that there is an adaptive mechanism available to man working in heat whereby he can reduce salt losses from his body, when conditions are sufficiently severe, to as little as five per cent of the original loss. A major portion of this saving accompanies and may be dependent upon the process of acclimatization. Yet, further adaptability, with respect to salt conservation, can be demonstrated in men usually considered to be fully acclimatized to work in heat. Further investigation by Conn showed that desoxycorticosterone acetate reduced the salt losses from unacclimatized men. From these and other observations Conn concluded that the mechanism by which man adapts himself to physical work in a hot environment consists of increased physiologic

activity of the adrenal cortices in response to enhanced release or activity of pituitary ACTH.

Men have to live and work in a large range of hot environments, both naturally occurring and artificial. The type of stress imposed on the body will depend partly on the type of environment. The two contrasting types of hyperthermic environment that can be easily distinguished are the dry and the humid. In a hot dry environment the stress imposed on the body in its attempt to maintain thermal equilibrium is directed to a great extent on the sweat glands as well as on the blood circulation. Where the temperature is constantly much higher than the body temperature heat cannot be lost by means of convection and radiation. Under such conditions sweating alone must therefore remove all metabolic as well as accumulated environmental heat.[4] In a hot humid environment when evaporative cooling is required it is limited by the high humidity of the air, and air movement becomes an important factor in allowing heat loss. When high humidity and absence of air movement occur in combination with a hot environment the skin will be continually wet, and this may cause considerable discomfort and even distress. The false impression may be gained that a great deal of salt and water are being lost through sweating, although the loss is much less than in a hot dry environment.[4] Replacement salt, i.e., salt tablets, should be used with caution in a hot humid environment to avoid the nausea and other distressing effects of hyperchloremia.

Acclimatization to Heat

The following paragraphs on acclimatization are based on the treatment of this subject by Horne[4] in his report on the effects of environmental heat in man.

The ability of the human body to function properly in a hot environment depends primarily on its ability to adapt its heat dissipating mechanism. The limit of tolerance therefore depends also on the limit of adaptability of the two principal factors concerned with this mechanism—the circulating and sweating systems. This adaptability is not fully revealed at the initial exposure to heat, and the optimum response is obtained only after prolonged exposure at levels below the limit of tolerance, or after repeated interrupted exposures. By means of this process the body can eventually tolerate environments that would be lethal in the unacclimatized state. The acclimatized subject is able to live in a hot environment in reasonable comfort, and to work in it with a minimal disturbance of pulse rate, blood pressure, and body temperature, and with an optimal sweating rate. Acclimatization is quite rapidly lost on withdrawal from a hot environment.

In addition to a physical adaptation to environmental heat it is essential that there should also be a psychological adaptation. The monotony of a constant hyperthermic environment may be an important factor to be reckoned with in adaptation to heat. One factor to which adaptation may be almost impossible is that adequate sleep, so essential for general well-being, and for the successful performance of work, may be very difficult to obtain under certain hyperthermic conditions.

Miscellaneous Effects of Environmental Hyperthermia

Exposure to extreme heat produces the well-known syndrome of "heat stroke."[30, 31] In man there may be erosions in the stomach and duodenum with bleeding into the gastrointestinal tract. Brain lesions, such as edema, hyperemia and hemorrhages[32, 33] are more prominent in acute heat stroke than in most other stress situations and hence may be regarded as somewhat specific of heat. There are less dramatic responses by mammals when they are exposed to mild hyperthermia. There is no "shock" in the ordinary sense of the word. Slight hyperglycemia, tachycardia, and leucocytosis may be the only detectable signs of "alarm."[7] Sleeth and Van Liere observed that in dogs a high environmental temperature resulted in lengthening the stomach emptying time with subsequent reduction in food consumption.[34] With the S91 melanoma as bioindicator, Hunter observed that above 32°C

an increase of only 1 to 2 degrees induced heat stress in mice as indicated by inhibition of tumor growth and anaerobic glycolysis.[35] Frankel *et al*[36] reported that Macaca monkeys secured to an animal board by means of wrists and ankles with arms and legs extended, in an environment of 38°C and 45% relative humidity, were unable to maintain their temperature equilibrium. Under the same conditions, when the monkeys were restrained on a wire mesh platform by means of a neck yoke and attachment of the arms along the side of the body, they held a steady rectal temperature in the normal range for five hours. Method of restraint at 29°C did not affect temperature equilibrium in the same animals. Ferguson and Hertzman[37] observed that physiological regulation of body temperature was continuously successful in three resting nude young men exposed for 32 hours to a dry bulb temperature of 109°F and a wet bulb temperature of 86°F (effective temperature —93°). The effects of heat stress on the ability of men to carry out simple mental tasks were investigated by Blockley and Lyman.[38, 39] These workers discovered that exposures for about 30 minutes to very dry atmospheres of 160°, 200° and 235°F had almost no effect on the mental and psychomotor performance of young men until some 5 to 6 minutes before they reached their limits of endurance. Pepler[40] measured the psychomotor performance of six subjects exposed for 30 minutes to a very warm, humid climate with an air temperature of 116°F, a wet bulb temperature of 105°F and an average air movement of 100 ft/min. In these experiments also, performance did not deteriorate at first, but during exposure to the heat, and most severely, during the last 10 minutes or so of work. Blockley and Taylor[41] found that in man the effect of an exposure to 180°F (0.5% relative humidity) for 30 minutes was more extreme when the stress was preceded by a 30 minute exposure to 130°F (18% relative humidity) than when subjects entered the hot atmosphere from an 80° comfort environment. Blockley *et al*[42] in their study on tolerance to high temperature aircraft environments, concluded that from a strictly thermal standpoint, ventilation with cool air beneath the clothing is the ideal method of extending tolerance limits of humans in hot environments where refrigeration is not practical. It is of some interest that the cabin temperature of the Mercury capsule is expected to rise to only 120°F during re-entry and that this temperature is expected to be easily tolerated by the Mercury Astronaut in an air conditioned space suit.[43]

Countering the Effects of Hyperthermia

Horne[4] lists three factors which enhance the development of the syndromes elicited by environmental hyperthermia. These are lack of acclimatization, limited adaptability of important organ systems, and additional stress to the heat regulating mechanism, for example, by physical exertion. Any action by the individual in a hot environment which tends to minimize these factors will diminish heat stress. It may eventually be possible to protect against the effects of hyperthermia by the use of certain drugs. DeBias *et al*[44] have studied the effects of autonomic blocking agents on the survival rate of adrenalectomized rats exposed to 37.5°-38.5°C for six hours. Thorazine (chlorpromazine) increased the survival rate of heat stressed adrenalectomized rats, its effect being enhanced by addition of subeffective doses of hydrocortisone. Pendiomide ditartrate was ineffective when given alone, but was protective when added to subeffective doses of hydrocortisone. Dibenamine, Regitine and Pro-Banthine appeared to be detrimental under the experimental conditions employed, although Dibenamine was found earlier[45, 46] to be protective against the stresses of formalin, hemorrhage and traumatic injury.

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Pulmonary Function Studies Used to Evaluate Air Pollution Asthma Disability

By

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HIGH incidence of asthma was noted in the vicinity of the city of Yokohama, (in 1946, shortly after the U. S. Armed Forces began their occupation of Japan). The 1946 U. S. Army Hospital, Yokohama, Essential Technical Data Report recorded that the clinicians at that hospital were seeing an unusually large number of patients with asthma. Because of this high incidence of asthma in the Yokohama area and the dramatic improvement of the patients when moved from there, the disease was popularly called "Yokohama Asthma." Since 1950 the disease has been observed throughout the Kanto Plain (Tokyo-Yokohama region) with increasing frequency.[1] It has become one of the major causes of morbidity among U. S. military personnel and their dependents in the area.

It has been a common observation in the Kanto Plain that the incidence of asthma is greater in dry winter months when there is increased smog concentration. The smog appears to be increasing in concentration and frequency with the increased industrial expansion of the area. We at the U. S. Army Hospital, Camp Zama, are now calling this disease "air pollution asthma" because we are reasonably convinced that it is due to industrial air pollution. This conclusion is supported by the common observation that flying personnel with this disease get dramatic relief upon reaching altitudes of five thousand feet above their Kanto Plain base. Also many patients obtain relief by going to the mountain resorts outside the Kanto Plain. These patients develop shortness of breath again on returning to their Kanto Plain base.

This asthmatic disease is characterized by coughing, wheezing, and shortness of breath. It occurs in normal healthy individuals who usually do not have a past history of asthma or other allergy states prior to their arrival in Japan. The typical history of these patients begins with coughing, usually at night or in the early morning hours. Their length of stay in the Kanto Plain before onset of symptoms varies from two weeks to one and one-half years. The patient is often seen for the first time at sick call in dispensaries, after having coughed most of the night. Physical examination at this stage is often completely negative. The patient is usually given a cough mixture and at times a broad spectrum antibiotic, which may or may not give relief. A few weeks later while experiencing wheezing and marked shortness of breath, he may be seen at night as an emergency. At this time he is treated with epinephrine or intravenous Aminophylline and obtains some symptomatic improvement. The response to emergency treatment is not as dramatic as in the usual case of bronchial asthma. From this point on the patient is seen with increasing frequency in military out patient clinics. He may have had several admissions to the hospital. At times his condition may be critical.

The most significant characteristic of this disease is that the patient becomes entirely asymptomatic after departure from the Kanto Plain.

COURSE OF EVENTS

The patient first seeks medical attention for chronic loss of sleep due to nocturnal coughing and wheezing. It is only after careful questioning by the physician that the pa-

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The opinions expressed in this paper are those of the author and do not necessarily express those of the Department of Defense or the Department of the Army.

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tient reveals his severe limitation to physical exertion because of shortness of breath which is insidious, so much so that he may not realize it. His military effectiveness is thereby greatly reduced. The patient usually remains on duty but requires medication. Some patients have been seen in the out patient clinic in the afternoon with very little objective evidence of asthma but may be critically ill eight or ten hours later. They then show the clinical features of status asthmaticus. This most frequently occurs when the patient's complaints are minimized and he is sent out with only minimal symptomatic treatment.

In the past it has been difficult to predict which patients can reasonably be returned to duty, those who may become unfit for full military duty, or those who may become critically ill. Both the patient and the physician may feel that the symptoms will subside on being returned to the Continental United States. Yet, to evacuate all personnel afflicted with this disease would drastically reduce the military effectiveness of many military units stationed in the Kanto Plain. Because of this dilemma we considered doing pulmonary function studies to provide more objective evaluation of the severity of the individual patient's disease. It is the purpose of this paper to present the results of these studies.

Materials and Methods Used in Study

We acquired a 13.5 liter Benedict-Roth respirometer with two speeds. One speed was 160 mm per minute which was suitable for doing maximum breathing capacities (MBC). The other speed of 32 mm per second was necessary to produce a spirogram from which flow rates could be measured.[2] The flow rates consisted of one-second vital capacity,[2] maximum mid-expiratory flow (MMEF), and mid-expiratory time (MET).[3]

We did pulmonary function studies on over 100 patients with this disease. Our report will contain data on the first 100 patients. Of the patients evaluated 78% were active duty military personnel, 9% were Department of Army civilians, 4% were Japanese nationals who had moved to Tokyo from outside the Kanto Plain in the last three years and the remaining 9% were dependents of military personnel. The patients' ages ranged from 17 to 57 years, the mean age being 27 years. To provide controls we did pulmonary function studies on 52 paratroopers located at the Sagami Depot Complex near Camp Zama. We chose this group because these men were actively engaged in jumping and were of necessity in good physical condition. The mean age in this group was 24 years. The Sagami Depot Complex is located in an area of the Kanto Plain where the incidence of asthma is considerably lower than in Tokyo or Yokohama.

All pulmonary function studies done on asthmatic patients were done between attacks when the patients were relatively asymptomatic. The results of these studies along with the spirogram were filed in a separate manila folder for each patient. This permitted us to have a ready reference on each patient after subsequent examinations. Patients admitted to the hospital had function tests shortly after admission, and again shortly before discharge. This procedure provided us with a fairly reliable index as to a patient's progress toward improvement. Many patients who were seen as out patients had pulmonary function studies before and after receiving Isuprel and saline by nebulization energized by oxygen, usually for ten minutes.

No function studies in this report were done on patients who were having an acute attack, because we were directing our attention to evaluating the patient when he was at his best. Between attacks is the period when clinical evaluation of the patient's ability to perform military duty is the most difficult.

Results

We have divided our studies into four main groups of patients. The first group,

TABLE 1

OUTPATIENTS—EVALUATIONS ON 64 PATIENTS
(Mean values)

	Before Isuprel Nebulization	After Isuprel Nebulization
VC*	4205 cc	4470
Predicted VC	3950 cc	3950
% VC to Predicted VC	107%	113%
1 second VC	3012 cc	3670
% 1 sec. VC to VC	71.8%	82%
MMEF†	2.68 liters/sec.	2.85
MET‡	.88 seconds	.86
MBC§	116 liters/min.	117.5
Predicted MBC	146 liters/min.	146
% MBC to Predicted MBC	79.4%	80.5

* Vital Capacity—1 sec. VC is normally greater than 80% of VC.

† Maximum mid-expiratory flow-definitely abnormal if below 3 liters/sec.

‡ Mid-expiratory time-greater than .80 sec. is abnormally long.

§ Maximum breathing capacity.

those patients who were seen only in the out patient clinic; the second group, hospitalized patients; the third group, patients requiring evacuation to Continental United States; the fourth, the control group.

Outpatients. The majority of the outpatients (Table 1) had essentially normal vital capacities.[4] They all showed considerable air flow obstruction manifested by reduced 1 second Vital Capacity, reduced Maximum Mid-Expiratory Flow, increased Mid-Expiratory Time, and reduced Maximum Breathing Capacity.[5] All of these patients had symptomatic improvement and some improvement of air flow rates after nebulization. The improvement of the air flow rates after nebulization was not as dramatic as the symptomatic improvement.

Hospitalized Patients. We evaluated 36 patients (Table 2) who were hospitalized because of the severity of their symptoms. Each patient had pulmonary function tests shortly after admission when his condition allowed the tests to be done. We also repeated the tests at the time of discharge to duty.

The above studies show that the patients improved considerably while in the hospital. Treatment consisted of various bronchodilators, antibiotics, expectorants, and even steroids. The studies, however, reveal that the patient was by no means normal on discharge. The patients in this group still show marked air flow obstruction. This group of patients had by far the greatest number of visits in the out patient clinic and were frequently readmitted to the hospital. Eleven of these at this date have been evacuated to the Continental United States. It is safe to assume that more of these patients will in the future be evacuated. This will most likely occur next winter between October and February ('60-'61) when smog concentration is at its height.

Evacuated Patients. We evacuated 11 patients to Continental United States because of the severity of their symptoms. (Table 3). This group does not include several patients evacuated because of asthma but had a previous history of asthma before coming to Japan. All of these patients had varying amounts of steroids over varying periods of time. It was noted that three patients were treated with adrenal steroids for longer than five months. All three continued to have severe shortness of breath after evac-

TABLE 2

HOSPITALIZED PATIENTS—EVALUATION ON 36 PATIENTS
(Mean values)

	Soon After Admission	At Time of Discharge
VC	3530 cc	4330
Predicted VC	3945 cc	3945
% VC to Predicted VC	89.3%	109.6
1 second VC	2168 cc	2895
% 1 sec. VC to VC	61.2%	67.0
MMEF	2.14 liters/sec.	2.20
MET	1.40 sec.	1.15
MBC	84.5 liters/min.	107.2
Predicted MBC	144/liters/min.	144
% MBC to Predicted MBC	58.6%	74.5%

TABLE 3

PATIENTS EVACUATED TO U. S.—EVALUATIONS ON 11 PATIENTS

(Mean values)

	On 11 Patients Before Evacuation	On 8 Patients After Evacuation
VC	4220 cc	4462
Predicted VC	3965 cc	4307
% of Predicted VC	106.5%	104.0
1 second VC	2485 cc	3488
% 1 sec. VC of VC	59%	78.2
MMEF	1.95 liters/sec.	3.05
MET	1.60 sec.	.83
MBC	106.5 liters/min.	169
Predicted MBC	144	143.8
% of Predicted MBC	73.4%	117

uation to Continental United States. None of these three patients had a previous history of asthma before coming to Japan. The group of three is too small to draw definite conclusions but it suggests that prolonged exposure of susceptible individuals to the irritating factors in the smog may produce permanent damage. The adrenal steroids made it possible to retain these individuals on duty, but may not have protected them from irritating factors. Eight patients had pulmonary function studies repeated after arrival in the Continental United States.

The results of these studies show the dramatic improvement after evacuation to Continental United States. As was mentioned before, this does not include those evacuated patients who had a history of asthma before arrival in the Kanto Plain.

Control Group. We did pulmonary function studies on 52 paratroopers (Table 4) who were actually jumpers. They were asymptomatic and denied a history of coughing or wheezing. The mean age was 24 years.

The above values are considered normal for soldiers of this age group.

CONCLUSIONS

It is apparent from these studies that all of the patients with this disease had marked air flow obstruction. The vital capacities were usually close to normal. The air flow rates in hospitalized patients were considerably worse than those in patients who were seen only in the out patient clinic. It was observed that many hospitalized patients were seen frequently in the out patient clinics and had several readmissions to the hospital. Many of these patients were examined at the time of the pulmonary function studies and no wheezing could be elicited. The only evidence of the severity of the underlying disease was the history of marked shortness of breath. External spirometric pulmonary function studies provide a useful and reliable tool to determine objectively the degree of air flow obstruction manifested by shortness of breath in these patients.

It is reasonable to assume that, with increasing industrialization in the Kanto Plain and accompanying increased air pollution, the incidence rate of this disease will increase. With increased smog in other areas, it may be that this disease will become manifest elsewhere in the world. The next obvious steps are to determine the etiologic agent or agents in polluted atmospheres and to eliminate them. Until that time comes, it will be necessary to evaluate and treat patients whose respiratory tract is susceptible to the irritants in polluted air. If the disease disables the patient to the point where he is no longer effective or his

TABLE 4

CONTROL GROUP—52 PARATROOPERS

(Mean values)

VC	5122 cc
Predicted VC	4380 cc
% VC to predicted VC	117%
1 second VC	4125 cc
% 1 sec. VC to VC	81%
MMEF	4.62 liters/sec.
MET	.58 seconds
MBC	166.4 liters/min.
Predicted MBC	159.5 liters/sec.
% MBC to Predicted MBC	104%

health is endangered, he should be evacuated. Pulmonary function testing will provide that element of objectivity needed in determining evacuation.

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POWER FOR PEACE

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A Long-Acting Sulfonamide*

By

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THE development of slowly excreted, and consequently long-acting, sulfonamides has given new impetus to the use of this class of antibacterials. In selecting an antibacterial agent the desiderata are therapeutic efficacy, ease of administration, low cost, and freedom from toxicity. In the current study the primary concern was with the last mentioned aspect of sulfadimethoxine (SDM), one of the newer long-acting sulfonamides.

An examination of the available literature on 2567 patients to whom SDM was administered revealed that 52 patients (2.03%) exhibited toxic reactions, all of which were mild. Of this group of over 2500 cases, 590 patients received the lower (1.0 gm. initially and 0.5 gm. daily) of two recommended doses; among these patients only 5 (0.9%) suffered adverse reactions. The remaining patients received a higher dose which in many instances was double the smaller dose. A regimen corresponding (on a weight basis) to the higher adult dosage had been used in pediatric patients.[1-4]

A transient leukopenia and an erythema multiforme of the hands and feet (the latter patient was also receiving a barbiturate) were the only potentially serious reactions. To the author's knowledge there have been no serious or fatal reactions to this relatively new sulfonamide. Table 1 summarizes these data.

Clinicians using the lower dose have obtained satisfactory results.[5-11] In severe infections the use of the larger dose seemed to be warranted.[12] The abundant blood level studies[1-4, 12-15] have not been too helpful in determining the proper dosage. There is no agreement as to what constitutes an adequate blood (or plasma)[13] level; and recent data has shown no correlation between sulfonamide blood levels and *in vitro* antibacterial activity of the serum.[16]

The present study was initiated with the hope of providing more data concerning the optimum dosage, as determined clinically by comparison of the two doses.

Since the inception of this study, 9 months ago, SDM has been the only antibacterial utilized on board the U.S.S. *Macon*, except for two treatment failures (one of which was subsequently treated with penicillin and the other with nitrofurantoin) and the routine use of penicillin in gonococcal disease.

One regimen consisted of 2 gm. on the first day of therapy, followed by 1 gm. in a single daily dose. Alternate patients received one-half this amount. The duration of treatment was from 4 to 30 days, with an average of 6 days. After treating 84 patients an analysis of the data showed no significant difference in the results nor in the rapidity of response to chemotherapy. Therefore, subsequent patients were administered the lower dose. A total of 153 patients were treated for a variety of upper respiratory infections, infections of the urinary system and of the skin, and one case of otitis media. Of these, 111 patients received the lower dose, and 42 the higher dose.

RESULTS

Of 111 patients on the lower dose 89 had a good result; of 42 patients on the higher dose, 33 had good results (Table 2). One patient with gonococcal urethritis which was not initially detected, did not respond on the half-dose. A cystitis persisted on treatment with SDM and the infection was subse-

The opinions expressed in this paper are those of the author and do not necessarily reflect those of the Department of Defense or the Department of the Navy.

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TABLE 1

SIDE EFFECTS DUE TO SULFADIMETHOXINE BASED ON ANALYSIS OF 2567 PATIENTS REPORTED IN THE LITERATURE[1–15,18,19,33–42]

Author	No.	Headache	Nausea Vomiting	Urticaria	Miscellaneous
Bagdon et al.*	35				
Barner	25				1 generalized maculo-papular dermatitis
Boger	82				
Cahn and Levy	134				
Cappuccie and Dobbs	39				
Daeschner†	590		16	2	5 morbilliform dermatitis 1 transient leukopenia
Elia	40				
Finegold et al.	31		1	1	2 mild eosinophilia
Glenn et al.	44		5		
Grace*	20				
Ironson and Pate	62		2		
Kiser et al.	185	1		3	
Krugman†	50				
LaVeck et al.	67				2 conjunctival injection and lid edema
Leming et al.*	120	1			
Levy*	44				1 erythema multiforme of the hands and feet
Michael	39	2			
Moore*	50			2	
Mosely*	50				1 generalized rash
Ross†	90		1		
Sierp and Draper	59				
Skinner*	160				
Townsend and Borgstedt†	78				1 maculo-papular dermatitis
Townsend and Borgstedt†	167				
Young et al.	42			1	
This series	153				
Totals	2567	4	25	9	14

* Received 1 gm. initially and 0.5 gm. daily while the other received a greater amount.
† Pediatric patients only.

quently eradicated with nitrofurantoin. One patient with tonsillitis showed poor results on the full dose, and penicillin was added to the regimen.

Because of the uniformity of the infectious processes and the availability of a comparison group[17] it is pertinent to comment on the group with exudative tonsillitis in which treatment with either dosage schedule gave similar results. This infection was common and the course prosaically repetitious. In 24 hours there was defervescence and disappearance of systemic toxicity, although subjectively the throat remained sore, and objectively there were no changes in its appearance. Within 48 hours the patient noted that soreness was greatly decreased or occasionally abolished, and objectively there was a notable decrease in edema with diminution of the purulent exudate and lessening of the erythema.

No untoward reactions were encountered in this entire series of 153 patients.

DISCUSSION

Necessarily, aboard ship, bacteriologic studies are not feasible. Therefore, the comparison between the two groups was based

on clinical criteria. The sequence of events as regards the eradication of symptoms in the group with exudative tonsillitis parallels that detailed by Weber and Seal[17] in a comparative study of different modes of penicillin therapy for tonsillar and pharyngeal infection. They also indicated that the course of the disease in the treated group did not greatly differ from that of the control group.

The favorable course and the known effectiveness of SDM against gram-positive organisms support its presumptive use.[18,19] Its safety as demonstrated in this series as well as by other investigators may, in part, be accounted for by its metabolism. Thus, sulfadimethoxine is unique among the sulfonamides in that it is conjugated with glucuronic acid. The glucoronide (15 to 25% of the total drug measured in blood or urine)[12,13] is highly soluble whereas the N4-acetate is less soluble than the free sulfonamide.[20] As the conjugated forms of sulfonamides tend to be more toxic than the parent compounds,[13] this metabolic variation may be related to the apparently low incidence of toxicity of SDM. Boger and Gavin cautioned that accumulation on the basis of a low renal clearance may result in side effects due to "excessively high circulating concentrations" rather than "toxicity."[12] This would be especially true with the larger doses, a hypothesis which this review appears to support.

On the other hand, another long-acting sulfonamide, which has been more widely used, has been associated with five fatalities,[21,23] as well as with severe reactions.[24,29] The incidence of untoward reactions to sulfamethoxypyridazine (SMP) has been estimated to be 6 per cent.[30] However, the incidence varies with the dosage and may be lower when optimal quantities of the drug are administered.[31]

Yet, sound medical practice dictates that despite the experience thus far with SDM, relaxation of surveillance for severe adverse reactions would be unwise, until its absolute safety is further established.

There has been recent concern over the role of the sulfonamides in kernicterus. Placental transfer of sulfadimethoxine does occur,[4,32] and the drug may release bilirubin from its protein-bound sites allowing more rapid diffusion to the body compartments.[4] Premature and newborn infants have an ineffective mechanism for conjugation of glucuronides,[32,33] which may interfere with excretion.[33] Present knowledge dictates that

TABLE 2

RESPONSE TO THERAPY

Infection	Full Dose				One-half dose			
	No. Pts.	Good	Fair	Poor	No. Pts.	Good	Fair	Poor
Tonsillitis	19	14	4	1*	39	36	2	1
Pharyngitis	12	10	2		38	32	5	1
Cellulitis	8	6	2		11	9	1	1
Urethritis, nonspecific					6	4		2†
Furunculosis					6	5		1
Prostatitis, chronic					6			6‡
Dermatologic	1	1			3	2		1
Cystitis	1	1			2	1		1§
Otitis Media	1	1						
Total	42	33	8	1	111	89	8	14

* Penicillin was added to the regimen.
† One had gonococcal urethritis which was not initially detected.
‡ These patients responded to digital massage but not drug therapy alone.
§ Treatment with nitrofurantoin eradicated the infection.

sulfonamides be withheld from pregnant women in the last trimester and from the newborn.

Summary

A comparison study with two different doses of sulfadimethoxine was carried out on board ship in 153 patients with a variety of upper respiratory and urinary infections.

Results were uniformally good with both the full and half the recommended doses. Thus, a dosage schedule of 1 gm. initially followed by 0.5 gm. daily appears to be therapeutically appropriate, although in severe infections a double dose is justified.

No untoward reactions were observed.

Accumulating experience indicates that sulfadimethoxine is an effective, inexpensive, easy-to-use antibacterial with a minimum of toxic reactions.

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A Philosophy of Hospital Administration in Relation to Personnel Economies

By

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INTRODUCTION

THE modern hospital consists of two basic parts, the physical structure of the buildings and grounds and the moral fiber of the buildings' inhabitants. Proper planning of the hospital's physical structure is predicated on the thoughtful management of its potential inhabitants; if the people who will work and serve in the hospital are consulted, their opinions sought, their advice heeded, then the hospital structure will not only house a happy treatment team, but it will also serve the patients more effectively and efficiently.

Hospital administration includes a process of planning for, organizing, directing, and supervising personnel within a physical plant in such a manner as to obtain the maximum efficient utilization of the available physical space and manpower in accomplishing the hospital's mission—providing the best possible care and treatment of the sick and injured. A constant effort should be made to provide the individual worker with the skilled leadership needed at every level, to utilize his aptitudes and interests to the fullest extent, to stimulate his initiative, and to win his loyalty. This effort calls for executive leadership by the hospital administrator. The hospital administrator must deal with several groups of people, including the community to be served, the administrative staff of the hospital, and the professional hospital staff. The community leaders are contacted by the public relations staff of the hospital as well as by the Administrator and, since this paper is concerned with internal personnel relations, this aspect will not be developed further.

PROFESSIONAL STAFF COORDINATION

Chiefs of the professional services should be included in the planning from the beginning. Professional hospital consultants are valuable, but the importance of coordination with the professional heads of departments and services must not be overlooked. To discount the doctors' opinions and suggestions of how they want their services built and managed is basically unsound. They know what is best for their patients and, of course, proper care of the patients must never be sacrificed for apparent materialistic gains. Efficient management, on the other hand, must be planned in conjunction with objectives which provide for the best in patient care.

ADMINISTRATIVE PERSONNEL MANAGEMENT

In managing the administrative aspects, concurrent planning with all affected members will conserve time and insure early solution of problems which might be involved. Interdepartmental and intradepartmental coordination should be sought through conferences and visits to insure that no problems are overlooked.

Respectful consideration to the opinions of the key people who will operate within the hospital must be given. The importance of individual thinking cannot be over-emphasized. To achieve personnel effectiveness in all phases of the daily operations we must not put ourselves in the position of wasting the talents and abilities of our personnel. We must utilize our people to the fullest possible extent and let them know that their ideas are important and that

The opinions expressed in this paper are those of the author and do not necessarily reflect those of the Department of Defense or the Department of the Army.

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their thinking is appreciated. This will inspire them to function effectively and will contribute materially to their development. The truly effective hospital administrator is a leader who encourages his subordinates to think for themselves and shows that he respects their contributions.

The entire field of hospital administration is a highly specialized one, and of course, the proper utilization of people means practicing personnel economy. We must take advantage of the ability and knowledge of our personnel and seek their advice, comments, and suggestions. When we delegate our responsibilities, we are actually making a reward of confidence in another person; however, this must be done with care and consideration.

In this age of specialization, the individual who knows all the answers is exceedingly rare or nonexistent. We must always be frank and keep in mind that the value of staff coordination and cooperation is of major importance. None of us must think that we know all the answers. We may have to make the final decisions, but we must realize that any endeavor is a cooperative undertaking and we must be open-minded in our thinking. A subordinate may have twenty ideas, but if only one is acceptable it is worthwhile to listen to all of his suggestions. This will be instrumental in stimulating his thinking, his initiative, his morale, and will be a definite and important aid in his development.

The protective phenomena of individuals, trying to hide their shortcomings is a widespread practice which we should constantly be wary of and try to overcome.

None of us is perfect, and we have all had different formal and practical educational experiences. Oftentimes what we have retained most vividly and specifically have been those things which have affected us vitally and in areas where we have, perhaps, not been too successful. As we mature in experience, and in our development as executives, many of our strongest qualities are those which were previously the weakest. Failures have often been called "stepping stones to success." The important thing is to profit from our mistakes, take constructive criticism in the proper manner, and constantly progress. We must be openminded and learn something from everyone with whom we associate.

Any organization should function as a team, with all members of the team working together toward a common goal. When they all understand and appreciate the problems of the other members of the team, it makes the accomplishment of the common mission much easier. When an individual believes in his own importance and really appreciates the value of the part he plays on the team, and when he knows that this is also appreciated by the other members of the team, then we have the *esprit de corps* without which no organization or team can succeed. It behooves us all to continually keep in mind the organization as a whole rather than only the part we as individuals play in it.

To achieve success, coordination and cooperation are vital necessities. Coordination is not difficult. Cooperation is sometimes difficult unless we, as leaders, display the proper qualities of leadership.

As an essential morale factor and to insure a continuing efficient operation, all individuals of the hospital must have the opportunity to develop their capabilities through intelligently planned assignments. We must always provide incentive for improvement and be fair and just in awarding recognition for outstanding performance of duty.

Hospital Plant Planning

The structural organization of the hospital has a direct bearing on the personnel economies of the hospital and the more antiquated the physical structure, the greater the number of personnel problems. Therefore, considerable judgment must be exercised in planning renovations and/or new structures in order that the fundamental relation of the physical plant to personnel economy will not be overlooked.

Any hospital must be built to provide for

maximum efficiency, and maximum use of equipment, material, space, and personnel. In planning a hospital or rehabilitating an existing structure, we must keep in mind our main objective: The best possible care and treatment for the sick and injured. Nothing must be allowed to become paramount to that objective, and we must ever bear in mind with each phase of planning the methods that will contribute to the best patient care.

The hospital should be constructed in a logical manner with homogeneous activities grouped together in the administrative organization and in the patient-care aspects. We should do everything we can to make work as easy as possible for our personnel, and this must be consistent with providing the best professional care. This will enable us to better utilize our personnel which makes for a pleasant, happy atmosphere, and this atmosphere is conducive to genuine personnel economy. The atmosphere which a hospital plant generates has a tremendous effect upon personnel effectiveness, and every hospital does have a distinct atmosphere. The psychological effects of a pleasant, attractive environment can often compensate for minor constructional defects.

The facilities used by patients should be located so they are readily accessible to the patient population. Closely interrelated elements should be located adjacent to each other, and we must keep in mind that the nucleus of our hospital is located in the areas of the wards, clinics, and operating rooms. There should be a reason for the specific location of all the different phases of activities in patient care, and in our reasoning we must ask and re-ask ourselves the question, "Is this the best solution for providing the ultimate in patient care and treatment?"

The specific factors that contribute to the relation of the structural plant's influence upon personnel economies are legion. They include the safety precautions that are built into a hospital to contribute to a low accident rate; the flow of patients and the flow of administrative tasks; proper speed of elevators; proper ventilation and climate control; corridors, stairs, and ramps of an adequate width and reasonable incline so that one person rather than two can manage litters and carts, and most important of all, to provide for the safety of the patient; and all the other concrete advantages that modern engineering and experienced hospital executive planners can provide.

There is a need for continuous and continuing planning for the utilization and improvement of the physical plant. If planning awaits an assured outcome of a current proposal, for instance, the firm appropriation of money for improvements, then the planning will be hurried and incomplete. Planning should be based on all the factors that might enlarge or decrease the hospital patient census, changes in the type of treatment needed by the community, and, specifically in these times, the impact of thermonuclear warfare on the community served by the hospital. The final plans must be flexible enough to adjust to changes that the various internal and external hospital influences might bring to bear.

Summary

1. We must never make the mistake of thinking that any phase of hospital administration is an entity in itself. Personnel management, psychology, human relations, and many other fields are important factors that enter into every phase of administration; we must practice preventive administration. We should be prepared for any foreseeable eventuality, and we must broaden our horizons in order to increase our ability to determine possible eventualities. Every experience we have becomes a part of ourselves and is a part of our sum total of knowledge. It helps us to see the big picture more clearly and to fit our work into that picture. It helps us to keep progressing instead of regressing, and we all do one or the other; we will never stand still.

2. A basic principle of personnel administration is to satisfy and to take advantage of the basic need people have for self ex-

pression in seeking and heeding the advice of our subordinates. We should take advantage of the pool of knowledge at our disposal and this will result in personnel economy.

3. We should always be aware of the effect of the physical plant on the patients, the professional staff, and the executive staff and seek ways to make improvements.

4. The importance of planning and the necessity of having our plans flexible enough to meet unforeseen situations is an important facet in personnel economy. Planning must always be continuous and continuing.

5. The administrator must ever be vigilant for ways to improve himself and to influence and stimulate his subordinates to improve themselves. He must be thoroughly honorable and honest, and here we may say that integrity is the sine qua non. He must remember that it is easy to fool yourself all the time, but you can't fool others for very long.

THIRTY-DAY CONFINEMENT

A second pair of Air Force jet pilots began a 30-day experiment at the School of Aviation Medicine in the Space Cabin Simulator, on March 14. They are Captain Ramon A. Horinek and First Lieutenant Eugene R. Carlson. Both are volunteers.

In the experiment they were maintained at a simulated cabin atmosphere of 18,000 feet. The oxygen concentration was equivalent to that at sea level. They were to be sustained by a supply of pre-cooked, dehydrated food of wide variety, and were to use their own recycled, purified body water for drinking, cooking and washing.

Information obtained will be useful in the man-in-space flights.

The American Revolutionary War Hospital Department

By
HOWARD LEWIS APPLEGATE

I

WHEN the American Revolution broke out in 1775, the colonial militias were not equipped with medical corps in any real sense of the word. Some civilian doctors had enlisted in the citizen-armies as officers, but only a few physicians cared for the physical needs of the soldiers, and these men worked only on an informal basis. At first, most provinces established temporary medical corps, composed of local doctors who were used on a part-time basis. When these new agencies became unsatisfactory, local officials designed permanent medical corps. Yet, even the permanent systems contained a number of defects. At first, many colonial officers, optimistically hoping for a quick conclusion to the war, refused to establish extensive and expensive medical staffs. Therefore, most original grants were insufficient to meet the needs of fullscale combat. Only with the realization that the war would be long and drawn out and that the efficiency of the Army partially depended upon the quantity and quality of medical services, did officials earnestly begin to develop effective medical departments. It was difficult to obtain surgeons because of low pay, lack of any status, military hazards, and governmental red tape. Medicines were not easily obtainable, and if available, their costs were prohibitive for limited hospital budgets. The absence of coordinated supervision was perhaps the greatest weakness. Division of authority and the resultant personality conflicts, dissension over methods and policy, and petty jealousies prevented even the most capable and well supplied departments from reaching their maximum efficiency.[1]

The skirmishes with the British at Lexington and Concord taught the New England legislators that local militias would not be adequate in fighting the enemy. Moreover, they realized that one province would not be strong enough to wage a successful war. Realizing the necessity of enlisting the support of all colonies in resistance to England, the Massachusetts Provincial Congress appealed to the Continental Congress to assume responsibility for its forces. This appeal came at a time when other colonies also became conscious of the need for concerted effort for defense. Consequently, on June 14, 1775, Congress voted to take control of these patriot militiamen. In an effort to bind all provinces to the cause, a Virginian, George Washington was elected Commander-in-Chief of the Continental forces. Later in the year, Congress established divisions of the Continental army in northern New York and the Southern provinces to prevent British invasion of those areas.[2]

One of the fundamental weaknesses of the Continental Army was the absence of coordination and cooperation among these three divisions. This situation developed when the latter two corps assumed an independent status, as a result of their isolated location and absence of specific rules subordinating them to Washington's authority. In late 1776, Congress reorganized the army into four divisions: the Eastern, comprising all territory east of the Hudson River and south of the St. Lawrence River; the Northern, consisting of upper New York and lower Canada; the Middle, including New Jersey, Pennsylvania, Maryland, and Delaware; and the Southern, for all states from Virginia to Georgia. The result of this reorganization was the coordination of the entire continental army under the Commander-in-Chief, who was given authority over all officers and enlisted men.[3]

When Congress had assumed control of the Massachusetts forces, no provision was made for a Continental medical department. This can be partially explained by the fact

that some congressmen assumed that the Massachusetts Hospital Department could care for all sick and wounded in that area. Others realized that a medical division would have to be established in the future, but felt that for the time being the colonial establishment would have to be sufficient. There were also those legislators unwilling to spend precious monies on medical services for a war that they expected would would not last more than several months.[4]

After the battle of Bunker Hill (June 19, 1775), however, when approximately thirty percent of the estimated 1500 Americans were either killed, wounded, or captured, Congress realized that a Continental Hospital would have to be created because the Massachusetts hospitals were inadequate for treating the wounded. Therefore, on July 27, "The Act for the Establishment of the Hospital for the Army" was passed. In colonial terminology, the word "Hospital" denoted in its widest significance a medical department, not merely a building for the sick and wounded. This act was also intended to provide centralized authority under a single administrative officer, called "Chief Physician and Director General of the Army Hospital." In theory he was in charge of all medical posts, but, when the act was passed, there was only one, that at Cambridge. When medical installations were provided the divisions in northern New York and in the South, the Director General assumed that he was in charge of these, yet his contemporaries regarded him only as the head of the Hospital at Cambridge. Here is an instance where legislation was not satisfactory because it was not specific.[5]

There are several possible explanations for the failure of this act. Probably the measure was intended only to be provisional, until a better plan was worked out. Perhaps, this explains why it was hastily written and poorly planned. It was also quite likely that the legislators did not have the slightest idea of the magnitude of the conflict facing them.

Congress supervised the Hospital through the Medical Committee, created on September 14, 1775. The membership of this administrative agency varied during each session of Congress and only a minority of the members were professional medical men. The Committee centralized the distribution of medicines and supplies, nominated medical officers, and inspected the various hospitals. On May 5, 1781, the Medical Committee was abolished and its powers transferred to the Board of War.[6]

The first hospital legislation naturally referred only to the forces at Cambridge under Washington's direct command, as it was the only Continental Army at that time. Thus, when other Army units were established in New York and the South, the army Hospital was unprepared to care for the sick and wounded in those areas. Consequently, Congress created separate hospitals for the latter army divisions.[7] Moreover, these hospitals, as they were established separately, tended to remain independent of each other, a situation which proved detrimental to the coordination of Continental medical services.

To provide necessary coordination and centralization in the medical department, Congress, on April 7, 1777, abolished the Hospital which had been established in 1775, and called for the formation of a new Hospital, to be separated into four districts, which corresponded to the military divisions. The districts were managed by deputy directors, who were personally responsible to the Director General. The Director General was given many powers and, as he assumed his responsibilities, he quite naturally added other duties. Thus, he became one of the most powerful men in the entire military establishment. His duties were varied and extensive. He examined all applicants for medical berths and appointed minor departmental officers. He established most hospitals, and saw to it that the sick men were transported to them and that the recovered men were returned to their regiments. He enforced all departmental rules

and regulations, supervised the professional methods and techniques of his surgeons, and was required to inspect all installations under his command. He controlled the purchase and distribution of departmental necessities and prepared Hospital budgets and vouchers for Congressional examination. Apparently fearful of this concentration of authority, Congress, on February 6, 1778, amended the act of 1777, to provide for decentralization of authority, thus giving the district directors almost autonomous jurisdiction in their respective areas. This virtually left the department without a responsible leader, as it had been in 1775. It appears that Congress did not know what it wanted, as shown in its vacillation between a strong-leader type of department and a weak-leader type. This lack of permanent, definite policy is illustrated by constant objections to both plans adopted. This legislation was not superseded until the passage of the Hospital Act of September 30, 1780, which was designed to restore all former administrative powers to the Director General. Again the duties of this position increased with a resulting revival of Congressional suspicion.[8]

Consequently, in 1782, Congress created the Medical Board to assist the Director General in departmental administration. This supervisory board, composed of the Director General, the Hospital surgeons, and an army officer who served as chairman and parliamentarian, examined all applicants for medical posts, established medical practice, estimated drugs and supplies needed in the hospitals and investigated all irregularities within the department. The Director General, technically an independent administrator, was obligated to take the advice of this board, which functioned as his cabinet. The board, which made direct reports to Congress, also appeared to be another agency of control over the Army and its auxiliary units.[9]

The Director General's immediate staff was appointed by Congress. Each district was superintended by a deputy director with the assistance of two administrative officers; a hospital surgeon general and a hospital physician general. These two men regulated the practice of surgery and physic within a particular district. In 1780, these three district positions were abolished and their powers assigned to the new post of hospital physician and surgeon general. This latter office was discontinued in 1782 when its functions were transferred to the Medical Board. The regimental surgeons and mates were supervised by an army physician and surgeon general. Two other district officers were the purveyor, who obtained and distributed supplies and provisions, and the apothecary, who prepared and issued medicines and drugs. Individual hospitals within each district were managed either by an assistant deputy director or by a chief hospital surgeon.[10]

As a consequence of the Hospital Chaplaincy Act approved by Congress on September 18, 1777, each district had one chaplain who visited the hospitals regularly, preaching to and praying with the patients. When an economy-minded Congress abolished the hospital chaplaincy in 1780, it ordered brigade chaplains to visit the medical posts. Director John Cochran wanted the re-establishment of the hospital clergy because he discovered that brigade chaplains neglected the sick and wounded as the latter did not want to visit the hospitals. As Congress was trying to economize, his request was denied.[11]

The structural arrangement of the staff was usually less than satisfactory as the department either suffered from over-centralization of authority or nearly complete decentralization. Naturally, each of the four districts had its own complement of medical officers doing the same tasks as workers in other districts. This decentralization fostered needless multiplicity of offices, as District medical officers were restricted to their particular district and could not work in other areas. For example, in 1780, General Horatio Gates' division, which was moving southward, was temporarily accompanied

by Middle district surgeons as far as Maryland. When Gates crossed the Potomac River into Virginia, however, the Middle district doctors were required to remain behind. Gates had expected Southern district surgeons to be waiting for him at the Virginia border, but apparently they did not know of his movements, as they did not locate the moving army for several weeks.[12] There was also intense competition among the districts. In 1776, there was constant bickering between John Morgan of the Middle district and Samuel Stringer of the Northern district over the allocation of supplies and drugs. When Stringer's supplies were exhausted, Morgan refused to send aid because Stringer was an officer of another district.[13] Yet, the only alternative to decentralization of responsibility that the Congressional leaders apparently considered was complete concentration of power in the person of the Director General. Neither of these alternatives, both of which were given several trials, proved to be efficient or conducive to good administration.

Despite the large staff of assistants, the Director General was personally responsible for many and varied duties. First, he had to establish hospitals. Within each district there were three types of hospitals: one general hospital operated by the Continental medical establishment, a flying hospital which was a temporary mobile medical post usually operated in the summer months by the Continental medical men, and regimental hospitals managed by the regimental surgeons and mates. During the earliest months of fighting, private houses were used as general hospitals, but as the war progressed, the medical department requisitioned barns, churches, college halls, and public buildings, which unfortunately were not originally suitable for housing the sick and wounded. Although barns were spacious and airy, they were often dirty and poorly heated. Churches were also used, but despite the fact that their pews could be converted into beds, this type of building was generally unsuitable for hospital purposes because of an absence of heat and proper ventilation. College buildings were also unsuitable because of their many small rooms. The unsatisfactory nature of these structures partially accounted for the construction at Continental expense of a three-story frame convalescent hospital located at Yellow Springs, Pennsylvania.[14]

Several types of structures were employed as regimental and flying hospitals. When the former were in urban areas, reconverted private houses were sometimes used, but generally regimental hospitals were located in camps where tents were used in the summer and wooden huts in the winter. Regimental hospitals were often modeled after the Indian council house, a three-sectioned log structure, the center room of which was 31½ x 19½ feet, and two wings which were 35½ x 16 feet. Each dirt-floored ward had a central fire, but no chimney, permitting the smoke to circulate freely about the ward and pass out a four-inch opening in the ridge of the roof, which was about five feet from the floor. Each wall had several slit-like windows. Flying hospitals were usually located in tents except when the army camped in one area for several months during which time wooden huts were used. A typical flying hospital was $15 \times 25 \times 9$ feet, with chimneys at each end and windows on the sides. Its dirt-floored interior contained six beds, a doctor's bench and chair, an operating table, and a medicine chest.[15]

Although a general hospital was managed by an assistant deputy director or a chief Hospital surgeon, the staff was appointed by the Director General. The professional staff included hospital surgeons and mates. There were two classifications of surgeons: seniors, the experienced and skilled veteran doctors; and juniors, the younger men who were their assistants. The surgeons operated and prescribed medicines, while their mates aided in surgery and administered medicines. A number of non-professional workers were attached to each hospital staff. The wardmaster collected the person-

al effects of newly admitted patients and issued hospital clothing. The steward distributed provisions and stores upon orders of the senior surgeons. The matron was responsible for preparing food, keeping the wards clean, and supervising the nurses, both male and female. Theoretically, there should have been one nurse for every ten patients, but this ratio was difficult to maintain because of two factors: the low wages paid to nurses, and the location of many military hospitals in isolated areas. The resultant scarcity of nurses was partially alleviated by the use of camp followers in the hospitals. Menial tasks were performed by the orderlies. The paymaster kept the hospital accounts and the hostler cared for the wagons and horses. A platoon of guards was attached to each hospital to enforce the rules and regulations.[16]

During the first few months of war, many soldiers were sent to the few hospitals. Here the battle casualties mingled with those infected with contagious diseases. There was also unlimited contact with visitors. This situation and the hostile attitude of the sick and wounded toward the medical establishment, made it necessary for the Director General to create a set of hospital rules and regulations. The regimental surgeons were required to prepare weekly reports, which listed the names of all sick, the rank and regiment, and the type of ailment and its condition. These weekly summaries provided the basis for the chief Hospital surgeon's report to the Director General, which was an inventory of medical officers, hospital expenses, medicines, supplies, and the sick and wounded.[17] Soldiers were admitted to the general hospitals only if they had a certificate from their regimental surgeon. After admittance, the new patients exchanged their personal uniforms for official hospital garb, if available.[18] Patients and medical personnel were prohibited from unauthorized use of hospital provisions and supplies. Order and decorum in the wards were maintained by the guards. To prevent outsiders' contact with diseases and reduce the interference with daily hospital routine, all visitors were required to have official certificates allowing them to enter hospitals. Patients were not allowed to be discharged from the hospital without an official release from the chief hospital surgeon.[19]

Closely associated with the Director General's power of appointment was his obligation to examine all those who wished to become hospital and regimental surgeons and mates. Applicants for medical positions were tested in the subjects of anatomy, surgery, physiology, and medicine. Besides these initial requirements, all candidates for surgeoncies had to demonstrate good eyesight and manual dexterity. The first two Directors General encountered fierce opposition from locally appointed surgeons whose competence as civilian doctors had never been challenged. A number of them resigned rather than submit to what they claimed was an indignity, while others simply refused to comply with the orders.[20] In the summer of 1776, General Washington revoked all medical commissions and required new examinations. At the same time Congress declared that no surgeon or mate had a valid commission unless certified by the Director General. Therefore, most of the military surgeons, estimated at nearly twelve hundred during the entire war period, were examined by the Director General or his deputies.[21]

The Director General was responsible for transporting the sick and wounded men to the hospitals. This could be easily accomplished if the scene of battle was near a general hospital to which the men could be readily transported and if there were a sufficient quantity of wagons available to carry the wounded. Most battles, however, were found to be a great distance from the general hospitals and wagons were usually difficult to obtain.[22] During campaigns, when the army was not in the vicinity of a general hospital, the wounded were cared for in flying hospitals. This was unsatisfactory for a number of reasons. Constant movement

was detrimental to the patients' health. Furthermore, the Army was not able to move as rapidly when burdened with large numbers of sick and wounded. In addition, the flying hospitals were frequently exposed to enemy fire and capture. The army staff thought that it had solved these problems when adopting a policy of leaving the sick behind under the care of local doctors.[23] The Director General felt that this plan was not satisfactory because of the high cost of providing care, the irregular methods used by local doctors, and the lack of Continental supervision over civilian physicians. The Director General recommended that when the number of sick and wounded of a campaigning army became excessive, generally considered to be ten percent, these men should be taken to the nearest general hospital, escorted by a platoon of soldiers to protect them from the enemy and to prevent the men from deserting.[24]

Medical authorities took great pains to provide the sick and wounded with a special diet. All hospitalized were removed from the regimental ration list and the monetary value of their provisions was used for the purchase of special hospital food, which consisted of such items as milk, barley broth, vegetables, ripe fruit, hard biscuit, fresh meat, rice, butter, tea, and wine. This fund was augmented by civilian contributions and also by some of the fine money collected from soldiers who had broken Army rules. There were a number of times during the war that several of the dietary items could not be obtained and the sick were given regular rations.[25]

Originally, the Director General had exclusive control of medical practice, that is, supervision of professional methods and techniques; and of purveying, which entailed supplying the department with all of its necessities.[26] This gave too much power and responsibility to one man, who did not have enough time to do both jobs adequately. Furthermore, the Directors General, who were professional doctors, often lacked the administrative talent necessary for purveying. Finally, this concentration of power combined with the complex structural arrangement of the department, served as an open invitation to graft and corruption. All evidences of departmental irregularity were supposed to be investigated by the Director General and reported to Congress. Yet, he might conceal his own illegal actions by falsifying reports, and Congress, whose own investigative committees were baffled by departmental procedures and structure, might suspect the Director General, but be unable to prove his duplicity. Consequently, critics of the department demanded that the purveying powers be taken away from the Director General. One of these fault-finders, Benjamin Rush, recommended that Congress establish a triumvirate of administrative leaders: an inspector general, a purveyor general, and a surgeon general, which would give the department a better distribution of responsibility. On February 6, 1778, Congress responded by giving the purveying functions to several of the Director General's assistants.[27]

The purveyor and his staff, which included purchasing agents, distribution assistants, clerks, and storekeepers, were responsible for obtaining all departmental supplies and medicines. There were three general types of supplies needed: special sick provisions; hospital furniture including beds, bedding, clothing, eating utensils, cooking and washing equipment, and candles; and medical necessities including bandages, instruments, herbs, paper, string, corks, and all varieties of drugs.[28] The purveyor's superiors gave him their estimates of future departmental needs. He then tried to procure these items from a number of sources such as state agencies, the Commissary General, the Quartermaster General, the Clothier General, the Continental Druggist, and Continental contractors. If they wished to obtain their supplies from private sources—importers, merchants, manufacturers, or civilians—the purveying department purchasing agents had to bid against other government representatives,

which resulted in artificial price increases on the desired items. After 1780, when the Commissary and Quartermaster branches were reorganized, one purchasing agent represented all branches of the government, and the purveyor forwarded his requests to this officer.[29] The purveyor was responsible for the distribution of all departmental supplies, but in this respect he was dependent upon the transport units of the Army, usually independent civilian teamsters who worked for the Quartermaster corps. That the lack of medicine and supplies in many hospitals was due to poor transport facilities is a fact that should be emphasized.

The apothecary received drugs and medicines from the purveyor. At his official headquarters at Carlisle, Pennsylvania, where the Continental arsenal was located, he prepared those items for use and delivered them to the various hospitals where they were distributed by his assistants. The apothecary also supplied each regimental surgeon with a chest of medicines and instruments, commonly called the "Apothecary Ration."[30]

Despite all efforts of Continental officials to procure medicines, they found, as did state leaders, that drugs were exceedingly scarce during most of the war. In 1776, many army hospitals were without medicines and provisions, which in part explains why the rates of disease and death were so high, reaching almost 20,000 deaths.[31] This scarcity was partially caused by Congressional lack of foresight, in not realizing that large quantities of medical supplies would be needed for full-scale warfare. Only when Congress became aware of the fact that the failure of American arms in 1776 was due in part to sickness and death, were steps taken to procure needed drugs and supplies in more realistic quantities. Therefore, during the period of 1777 to 1780, when Congress was determined to prevent another catastrophic year like 1776, it gave the department a sufficiently large budget (at least one and one-quarter million dollars in 1778 and at least two and one-half millions in 1779) to allow the purchase of medicines.[32] In 1781, the hospitals were again without many essentials when Congress, disturbed by the revelations and rumors of graft during the court martial of Director General William Shippen, slashed the medical budget. This cutback in funds came at a time when the inflationary economy drove the prices of medicines up, and, as a result, Hospital purchases were severely limited.[33]

The Director General estimated the department's financial needs and personally accounted for its expenditures. He submitted to Congress proposed budgets for each three month period. As these financial recommendations were debated on the floor of Congress and were usually greatly reduced, the Director General found it prudent to request substantially more money than was needed. For example, one million dollars was requested for the second period of 1779, but after Congressional deliberation, the Hospital received only one-half of the amount, a sum which nearly approximated the Director General's needs.[34]

After approval of the Director General's budget request, Congress usually made provision for supplying the medical allotment either by assigning the department a certain percentage of state loans or by setting aside part of the new issuances of currency. When money was not readily available, Hospital expenses were paid with government credit slips, certificates, or army vouchers. The total expenditures for the medical department throughout the war are unknown, because the records are incomplete. Furthermore, many expenses for food, supplies, transportation, and chaplains were charged to other government agencies. From all indications, expenses during the first two years were moderate, yet constantly increasing. In 1778, at least one and one-quarter million dollars was spent, and in 1779, at least two and one-half millions. Lest one get the impression that Congress was generous, it should be remembered that inflation reduced the purchasing power of

the department's allocations in the latter war years. After 1780, medical expenses were greatly reduced when Congress became suspicious of the department as a result of the Shippen trial.[35]

While inspection of the hospitals was one of the Director General's important responsibilities, it was virtually impossible for one man to visit the hundreds of medical installations located in the thirteen states. In 1777, General Washington instituted an inspection system and distributed the Director General's responsibility among a number of reliable staff officers, who visited hospitals and submitted detailed reports listing the number of sick, convalescent, and dead. They evaluated the work of the staff and initiated court-martial proceedings against negligent surgeons. In addition to checking the hospital accounts, they also suggested new ways to improve care of the sick and recommended locations for new hospitals.[36]

The last important duty of the Director General was that of discharging the men from the hospitals. During the first two years, when the few hospitals were literally filled to the rafters, militiamen considered to be unfit for further military service were discharged. This plan encouraged men to pretend to be sick in the hope of getting a discharge. When the officers realized this, the practice was abandoned.[37] Sometimes the sick escaped from the hospitals to return to their regiments where they might spread infection. Others tried to reach home and died on the way. To correct this, the Director General ordered that no man could leave a hospital without an official certificate from the chief hospital surgeon. Men who left without such releases, and those who were discharged for duty, but did not return to their regiments, were considered deserters.[38]

The Continental Hospital had a number of advantages over the state medical departments. There certainly was greater uniformity of technique and procedure and cooperation between hospitals and medical personnel. This was not achieved haphazardly but came as the result of more centralized agencies of control. Generally, the Continental Hospital staff appeared to be more professional than the state medical men, probably because of more extensive use of comprehensive qualifying examinations, higher pay than state departments, and usually quick dismissal of incompetent surgeons. Departmental rules were enforced by official inspectors, a system conspicuously lacking in most states. Finally, the medical staff was financially responsible for its income and expenditures.

There were also certain defects in the Continental Hospital system, some of which were never corrected. While examinations were used as the basis of appointing most medical men, many administrative offices were awarded as a result of political pressures rather than professional ability. Excessive reliance was placed on regimental and temporary flying hospitals. There was no organized system of collecting the wounded and taking them to the hospitals. During most of the war years, departmental methods of purchasing and distribution were not economical or efficient.

Without any doubt, the greatest defects can be traced to the structural arrangement of the staff and the distribution of authority and responsibility. At times the Director General possessed exclusive authority and all matters despite their triviality had to be brought to his attention. For a number of years he supervised medical practice and purveying and was not able to do justice to both demanding aspects of his job. It is not unfair to say that overcentralization of power accounted in some measure for departmental inefficiency. Yet, the only alternative given a fair trial, nearly complete decentralization of responsibility, was no better. The Hospital was divided into four districts, which corresponded to the army divisions. Unfortunately, medical personnel were restricted to one district causing needless multiplicity of offices. Congress tried no other alternatives. Very likely the best an-

swer to this problem of staff arrangements would have been a moderate plan—with the Director General having central control, but being checked by other outside agencies, and the departmental subdivisions having some autonomy in local or trivial affairs, but referring all important matters up through an established chain of command—a fact in hospital legislation, a fiction in practice. Instead of subdividing the department into districts, it would have been far more efficient and logical to attach a staff corps to each of the four Continental armies.

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(To be continued)

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EDITORIALS

Poliomyelitis

IT IS heartening to learn that an effort will be made to strike at poliomyelitis where the greater number of cases exist. We have pointed out this need on several occasions.

The vaccination program must be carried to the lower socioeconomic group. Free vaccine is not the only answer. Indifference, fear of injections, lack of knowledge about disease generally, ready charity in case of the development of disease, are factors that must be considered before this segment of our population will get interested in reducing the morbidity rate, particularly that of polio which now is striking that group in greater proportion than any other.

The problem is not one of an easy solution. On television, on radio, in motion picture theaters, in newspapers, in magazines, yes, even in the churches and schools must the word go out: "poliomyelitis can be wiped out but you must help."

The Salk vaccine is available, even now in a better form. But it must be injected. Many fear the needle. This could be overcome by using a new injector type apparatus. Thousands of doses can be given quickly. The Navy has had much experience with this injector and has found it to be highly satisfactory. It removes the element of pain.

Oral vaccine which will overcome the fear of the needle will not be with us, it seems, in 1961. But the Salk vaccine is available now and in ample supply. Let's use it; let's all get behind this program and get it down to the group which is greatly in need of the vaccine, not forgetting of course those who seek the vaccine of their own accord.

Desalting of Sea Water

PRESIDENT KENNEDY has rightly become greatly concerned about our dwindling water supply. He foresees trouble unless we start storing vast amounts of fresh water and retarding the flow of this precious liquid to the sea.

Once the sea gets this fresh water we know the result. We have lost it. Now how to get it back economically. The President has proposed a near crash program for research on the project. It is not an easy one to solve but it must be solved. The program is a vital one for all nations. Where deserts now exist fertile land can exist if only man takes the program to heart. This he must do sooner or later. It is nice to know that such an important person is going to be behind the program.

Think what changes would be made in sanitation alone if people could have an ample supply of water. Cleanliness being next to godliness as the old saying goes will work wonders with the health of the world. Bodies as well as souls will be saved.

We are hopeful that this program is one that will not be lost sight of in the press of missiles and space travel.

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COL. CHARLES R. MUELLER, U. S. Army, Ret (Vet. Adm.) (1958)
MAJ. GEN. H. H. TWITCHELL, USAF, MC (1959)
REAR ADM. RICHARD A. KERN, MC, USNR, Ret. (1960)

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Around the World

(Ser. IV, No. 4)

By

CLAUDIUS F. MAYER, M.D.

DENMARK'S statistics of health show an alarming rate of chronic renal diseases with uremia, especially among women. It is thought that the chief reason for such an increase is the *excessive use of phenacetine* (acetphenetidine). Physicians have called attention to the pathology and the characteristics of interstitial nephritis in Switzerland and in Denmark, the two countries where phenacetine is consumed to a great extent. Between the years 1951 and 1957 the sale of this drug has doubled in Denmark. Among the elderly Danish women, the *mortality rate from renal diseases* has grown during the same period from 100 to 135 per 100,000. Although the role of phenacetine abuse is not quite clear in this respect, many observations are now available for the justification of such an assumption.

From the Ophthalmological Department of the Kuipo Central Hospital in Finland comes the strange report of a *vicarious menstruation in the eyes.* It is the case of a middle-aged woman who had periodic intraocular hemorrhages in connection with her menstruation. These incidents ultimately led to glaucoma and cataract. Such cases are extremely rare. The medical literature has references to only three other such cases in the world.

The English "Times" had a brief note about the Mayor of a little village in France, the village of Aromas, near Dijon. He complained that his *authority is being undermined by madmen.* Indeed, his village has 148 sane inhabitants, and an insane asylum whose inmates according to the French laws are entitled to vote. Now, the madmen outnumber the sane population, and they vote in one block, and always for the opposition. The trouble, says the Mayor, is that the inmates of the asylum come from all parts of France, and, for this reason, they should not be allowed to control the affairs of Aromas.

A member of the London Hospital Medical College (R. J. Harrison) became interested in the *physiological effect of diving on seals.* All mammals can withstand complete submersion in water for a little while, but some forms are able to remain submerged at considerable depths for remarkably long period of time. A pigeon can stay under water for one minute, a man for 2½ min., a duck for 17 min., a muskrat for 12 min., a seal for 20-28 min., a whale for 2 hours. The statistics of comparative diving depths are necessarily inaccurate, but some seals were caught on hook in 273 m depth, a man can dive down (in a suitable dress) to 165 m depth, a sperm whale to 900 m. Experiments carried out on seals (*Phoca vitulina*) of different ages also included the observation of the heart rate and respiratory rate. During dives, bradycardia occurs transiently, the pulse of the animal drops down to 6 beats a minute, which may occur one to three minutes after submerging. Then, the heart rate again increases. The same kind of bradycardia is also produced by simply increasing the air pressure to a simulated depth of diving. At the time of bradycardia, the respiratory rate was also lower, provided that the seal tried to hold its breath. One wonders what the comparative conclusions of such experiments may be for human physiology.

The *study of brucellosis* has been going on with increased vigor all over the world. For some countries, especially for Tunis, the knowledge of the disease is extremely important from the national economic point of view. The World Health Organization also has been very active in this field, as is evident from its publication. The infection is found in many different animals. It is often transmitted to man by *cheese made of unpas-*

teurized milk. There are now brucellosis centers at the most important foci of the disease; they are available for both practical and theoretical work, including the production of diagnostic antigens, and the distribution of the various available vaccines against brucellosis.

An almost unique case of *arsenical poisoning* caused some interest recently in British forensic medical circles. A 28-year old woman died from such poisoning after she received a large number of acetarsol *pessaries* (?) for the treatment of a vaginal discharge. One pessary contained 0.26 g of the arsenical. At one time, 18 such pessaries were inserted into her, and two days later another 12. Such a treatment has been hitherto considered safe for the patients.

Treatment of trichomonas infestation has a long and varied history. Recent British studies point out that the most common source of the infestation is through sexual intercourse. Local treatment often fails. Search for a remedy effective by *oral use* finally produced *metronidazole* (1-beta-hydroxyethyl-2-methyl-5-nitro-imidazole) which was first tried out in France last year. The published results show a cure rate of over 80%. The results tentatively suggest that the drug is also effective for men. Local treatment of trichomoniasis seems to be no longer necessary.

In the latest report of the *Registrar General of Britain,* it was noted that stillbirth and infant mortality continued to decline in England. The life expectancy shows now 68.0 years (at birth) for British men, and 73.7 years for women. The loss of working life in the male sex was by cancer, accidents and coronary disease mainly (40%), and among the women it was chiefly due to cancer, bronchitis, and pneumonia, and cardiac diseases.

A few years ago, the *British Advisory Council on Scientific Policy* stated that a country's wealth and power are to-day largely determined by the extent of its scientific knowledge and its capacity to use that knowledge. More recently, the same Council found that the British resources devoted to research and development for civilian purposes were still far too small for Britain's needs. Beside the economical, there are also other problems, one of them being the lack of flexibility and the *rigidity of the old-fashioned categories* of scientific fields. There is little collaboration between the sciences, and research people of different fields do not understand each other's progress. The Council believes that technological progress depends ultimately on the scientific work in the universities and technological institutions. It also comes to the conclusion that the scientific effort of Britain is losing ground in certain fields in comparison with the competing nations. Pure mathematics is lagging behind in Britain, and oceanography and taxonomy also have been neglected; other lagging areas are optical astronomy, seismology, some field of medical science where *further research effort* is desirable, as for the study of mental illness, dental disease, and of the social and industrial aspects of medicine. The decline in these fields is partly explainable by the high costs of research projects.

The Superintendent of the Canadian Northern Health Services has been discussing the *mental health in the North,* and other related problems. For instance, a special problem is a suitable planning of towns. In the past the pattern has been to make a scattering of one- and two-story wooden buildings, liberally spaced against the hazards of fire. Inuvik at the Canadian Arctics was built so. But the cost of providing the carefully spaced buildings with power, water, and sewage system (not to mention roads, telephones, garbage removal, etc.) is tremendously high. Another trend could be possibly started, and the *towns in the Arctic* could be very compact, perhaps one town under a single roof. But the superintendent is in doubt, because "what would be the mental health and social problems created by *living in a monster pentagon* of this kind?"...

At an October (1960) meeting in the Central University of Venezuela, representa-

tives of Latin American national research councils and of universities discussed the organization of scientific research in Latin America. Unanimous was the agreement that the present funds are notably insufficient. As a general guide it was suggested that the governments should spend 2% of their national budgets on scientific research. National research councils are working only in Argentina, Mexico, and Brazil. It was found that shortage exists both in research and *in* teaching personnel. Too much ado was caused by the problem whether university employees should be on a *full-time basis,* or whether they should be allowed to engage in extracurricular activities. The recommendation was for the full-time system, with corresponding increase in the salaries and with improvement of the working conditions. UNESCO promoted the establishment of regional centers of research, such as that for mathematics in Buenos Aires, and also suggested that groups of research teams should agglomerate (e.g., Latin American Council for Cosmic Radiation). The discussion also suggested the opening of an *International Andean Year* during which teams of scholars would attack the many problems of this vast mountain chain.

A poliomyelitis epidemic occurred in Mauritius. Several of the cases were of the paralytic type. The epidemic gave an opportunity for the comparison of the Salk-type and the Sabine-type of vaccines. Before the epidemic, many children were vaccinated with the Salk vaccine, and among them only one had subsequently a paralytic infection, whereas 78 other paralytic cases occurred among non-immunized children. The Salk vaccine was from Canada. The administration of the Sabine vaccine started 11 weeks after the outbreak of the epidemic. How far it contributed to the abatement of the infection, will be known only after further studies. (By the way! The Director of the Medical Service of Mauritius is an Hungarian physician, Dr. E. Losonczi).

There is a new *occupational disease among tropical entomologists.* Their nostrils may be selected by some ticks as a hide-away. Such cases have been recently observed among entomologists who penetrated the forests of Uganda, Bunyoro, and Kigezi. The immature nymph of some Amblyomma ticks may drop on a man's body, and crawl up into the nostrils, where it may cause some tenderness, but no particular reaction. The exact nature of the "nostril ticks" could not yet be ascertained.

This year, a scheme of *Flying Doctor Service of Africa* will be launched in Northern Nigeria. An African flying doctor would maintain wireless contact with mission nurses and African village dispensers, and would support them with frequent visits by the air.

Henna has been used in the western countries chiefly as a hair-dye. In the Orient, it has many other uses, such as a decorative browning at various ritual ceremonies, and even as a fungicide for some skin infections. An Egyptian doctor reveals that he had been using *henna for intestinal amebiasis and moniliasis.* Henna is given in cachets (2 g of powder in each) 3 times daily after meals. Improvement is said to be prompt. The active principle of the henna therapy is one of its dyes, the 3-hydroxynaphthoquinone, which is an analogue of the dye in the black walnut, and is a strong fungicide.

As a medical professor of the *University of Khartoum* stated recently, *women of the Northern Sudan* develop baldness over the center of their scalp in association with tight plaiting of their hair. The condition is the result of traction on the roots of the hair. Other examples of *traction alopecia* are the marginal baldness of Negresses who use the hair curlers for straightening their hair. In some women, alopecia develops over the area where the bun rests on the scalp. European women do not show this type of baldness.

Some of the scholars of the University of Khartoum spent their vacation among the uncharted hills north of Port Sudan. They observed a wide range of autumn *temperatures in the Red Sea hills* of the Sudan. On September 24, at 13 o'clock local time, when the air temperature varied between 105-

110°F, the surface sand temperature was 182.5°F, as measured with an electrical resistance thermometer. The only animal they saw was a lonely grasshopper. Four hours later, when the air temperature dropped to 90°F, the sand temperature measured 100.5°F and some ants were found crawling over the sand. The surface temperatures of sand are very high in the desert regions. For instance, on the Loango Coast close to the equator the temperature may reach 185°F, on the Sahara sand dunes it may climb to 172°F, and near Cairo it may be 131°F. The finer the texture of the sand, the higher its temperature may rise.

Among the *Polynesians a form of "trachoma,"* or rather granular conjunctivitis is frequent. Polynesians are a very clean and civilized race, and free from the neuroses of the 20th century. Nevertheless, about 40% of them have this granular form of conjunctivitis. It is partly the result of certain racial customs. Thus, the Fijians and the Samoans use a small fire within their huts for cooking and heat. Since the windows are closed up, smoke accumulates. Hence, most Fijians have chronic catarrh and sore eyes. The Indian and Chinese races, forming about 50% of the South-West Pacific, have their fires outside their shacks. The "trachoma" is, therefore, far less prevalent among them. The absence of flies is very noticeable, and so is a marked scarring of the cornea. In trachoma, the cornea loses its sensitiveness. Hence, it is much quicker to carry out an eye survey by touching the cornea with a cotton swab. Those who do not react with a blink reflex will require further study, and an eversion of the upper eyelid for detection of granulations and pannus.

Studies of *Czechoslovakian* virologists show that epidemics of *tick-borne encephalitis* can be spread not only by tick bites (Ixodes ricinus) but also by *raw milk of goats and cows.* In the endemic areas of this variety of encephalitis, some cows may harbor as many as several dozens of ticks; thus, the cows are easily infected with the virus. It was demonstrated that from the cow's blood the virus is partly excreted in the milk.

Neurovirus infections in the Ukraina are of special interest to Russian virologists. In recent years, it was revealed that the various neuroinfections have their natural foci also in the forested areas of the Carpathian Mountains, in the Cis-Carpathian region, and in Northern Bukovina, where for instance the tick encephalitis is endemic. It is the same area where recent observations also showed the presence of the virus of epidemic hemorrhagic fever. Undoubtedly, the Cis-Carpathia is one of the natural foci of this strange infection. The study of this focus was entrusted to the Uzhgorod Institute of Epidemiology. Other forms of epidemic hemorrhagic fevers (e.g., the Crimean type) are studied at the Mechnikov Institute of Odessa.

At the *Conference on Pavlovian Physiology and Psychology,* which was held last October (1960) at the New York Academy of Sciences, one of the Russians who attended the meeting pointed out that there is sometimes a very close *relation between a person's mental condition and his immunological reactivity.* For instance, in such mental diseases as catatonic schizophrenia when the patient does not react to changes in his environment he will not react even to the inoculation of antigen; his organism stopped to produce immune bodies against infection. In Parkinsonism, also, the immune body production is reduced. On the other hand, idiots will produce high levels of antibodies. The Russian psychiatrist also found that drugs which cause somnolence will also make the antibody production "sleepy."

In many European countries, public health administration is divided between different agencies, which may cause difficulty and delays. In Soviet Russia, the *Sanepid* (sanitary and epidemiological) *organization* does not have such a handicap. These stations are in a network which is responsible for preventive medicine everywhere, even in small villages. The center is the Ministry of Health in Moskva; to this are subordinated the central health offices of the individual republics; to these offices belong the individual Sanepid

stations. In rural areas, public health matters are dealt with by regional hospitals.

An American doctor (P. C. Hodges) who recently returned from travel in Russia and free China, pointed out in a lecture that there are more than 2000 *sanatoriums in Russia* with facilities available for almost 300,000 patients, 900 *holiday homes* housing about 160,000 guests. These establishments are owned by the central and the provincial governments, the trade unions and the farm groups. The Filatov Institute of Odessa has made excellent progress in *corneal transplants.* The eyes are supplied by the undertakers, who make the enucleations without asking for any permission from the relatives. Does this mean that in communist Russia the State is claiming not only the soul of the individual but also the corpse?

In Russia, Chumakov believes that the *Salk vaccine* is still used in the United States because of the conservatism and resistance of private medicine. Russia has an ardent desire to reduce the importation of drugs as much as possible. Thus, for the substitution of foreign protein they have already isolated two other glucosides, *frugozide and gomfotin,* at the Omsk Medical Institute. More than fifty percent of the Russian people are living in villages. On the other hand, the rate of physicians who live in the country is only 11%. Moreover, the *distribution of doctors* also differs according to the districts. For instance, in Georgia there are 3 doctors for every 1000 inhabitants, while in Tadzhikistan the doctor-population ratio is 1: 1000, and in Belgorod 0.6 :1000. One of the basic troubles seems to be that young graduating doctors are *fed up with the communist practices* of being assigned to posts which they do not like. In Kazakhstan, 20% of the graduates failed to report to their assigned posts.

Since the launching of the sputniks, the literature on *space travel and on the nutrition of the astronauts* is steadily increasing. Suggestion was made of putting the astronauts "on ice" so that their metabolic requirements would be reduced during the flight. It was found that weightlessness would cause nausea and vomiting, and would interfere also with the mechanism of deglutition. Others said that the food would regurgitate. *Low-residue diet* was also suggested, preferably in a liquid form, maybe squeezed out from collapsible tubes. Of course, in total darkness the psychological stimulus of an unusual food or of an unaccustomed food may be nil. Then, even the *cultivation of algae* on the ship had been suggested so that the astronauts would have something fresh and green. Others, with some success, were able to develop *synthetic diets* where one gram of food contains 8 calories. Actually, more effort should be concentrated upon the possible development of an adaptation in the astronauts (who are anyhow a selected small group) to all kinds of dietary regimen, rather than to concentrate on the *psychological effects of food in space exploration.* Those who have already proposed the development of a large nuclear-powered space vehicle, complete with bedrooms, bath, gymnasium, library, and sick-bay, which will carry 8 astronauts on a long-term reconnaissance mission to the Mars and/or Venus by 1970/71, will surely be able to condition also the environment of the travellers and their foods so that they will create the most favorable emotional effects... Multa paucis!

The Sir Henry Wellcome Medal and Prize

COMPETITION FOR 1961

THE AWARD consists of a medal, a scroll, and a cash prize of $500 to be presented during the Annual Meeting of the Association of Military Surgeons of the United States, November 6, 7, and 8, 1961.

The competition is open to all medical department officers, former such officers, of the Army, Navy, Air Force, Public Health Service, Veterans Administration, The National Guard and the Reserves of the United States, and commissioned officers of foreign military medical services. No person shall be eligible for a second award and no paper previously published will be accepted.

Six copies of an essay (3,000-10,000 words) which reports some original work in the field of military medicine must be submitted to the Secretary of the Association and must bear a postmark no later than 15 June 1961. Manuscripts must be double spaced. The true name of the author must not appear on the manuscript. A *nom de plume* or symbol must be used. A sealed envelope bearing the *nom de plume* or symbol on the outside and an enclosed paper giving the true name and address of the author must accompany the essay.

Subjects may be in the theory and practice of medicine, dentistry, veterinary medicine, or sanitation. The winning essay becomes the property of the Association and will be published in MILITARY MEDICINE.

Federal Nursing Service Award–1961

THE AWARD consists of an honorarium of $500 and a scroll which will be presented during the Annual Meeting of the Association of Military Surgeons of the United States.

Any nurse in the Federal Nursing Services is eligible providing she submits an essay (3,000-10,000 words) which reports on the most beneficial study of or contribution to professional nursing in any area of practice. The subject material of the essay may be the result of the study or actual experience or a combination of both.

Essays must be submitted in six copies, double spaced, on standard size paper with the name of the author omitted, but a *nom de plume* substituted. An accompanying sealed envelope with the title of the essay and the *nom de plume* on the outside and a paper on the inside bearing the true name and address of the author must accompany the essay.

The manuscripts must be mailed to the Secretary of the Association and bear a postmark no later than 15 June 1961.

NOTES

Timely items of general interest are accepted for these columns. Deadline is 1st of month preceding month of issue.

Department of Defense

NEW MEDICAL ORGANIZATION DD

Under the new organization of the Department of Defense "the* position of Assistant Secretary, Health and Medical, will be left open or eliminated," and the functions will be transferred to the Assistant Secretary for Manpower. The former Assistant Secretary, Dr. Frank B. Berry, becomes the Senior Medical Advisor to the Assistant Secretary (Manpower) and Dr. E. H. Cushing will continue as Deputy Assistant Secretary of Defense (Health and Medical). The Assistant Secretary, Manpower, Honorable Carlisle P. Runge, has stated that it is his intention to maintain the office and its functions, its committees and its liaison activities without change.

IN URUGUAY

Dr. Frank B. Berry, Senior Medical Advisor to the Assistant Secretary of Defense (Manpower) and Chairman of the Interdepartmental Committee on Nutrition for National Defense; Dr. Arnold E. Schaefer, Executive Director of the Committee; and Mr. Walter Rudolph, Department of State, were in Montevideo, Uruguay, 5-9 March 1961, to make preliminary arrangements for a nutrition survey which has been requested by that Government.

NOTES

Dr. E. H. Cushing, Deputy Assistant Secretary of Defense (Health and Medical), represented the Department of Defense at the 14th World Health Assembly, in New Delhi, India, during the period 7-24 February 1961.

COMMITTEE ON AVIATION PATHOLOGY

The Joint Committee on Aviation Pathology recently held its 7th Annual Business Meeting at the Armed Forces Institute of Pathology, Walter Reed Army Medical Center, Washington, D.C.

This is a committee of the Armed Forces of the United States, United Kingdom, and Canada, which studies the role pathology plays in aviation and flight safety, and acts as a focal point for the distribution of information on this subject.

MEMBERS OF THE JOINT COMMITTEE ON AVIATION PATHOLOGY: *(L to R) Front row*—Wing Commander David O. Coons, RCAF; Squadron Leader Peter J. Stevens, RAF; Howard T. Karsener, M.D.; Colonel Joe M. Blumberg, MC, USA; Frank W. Hartman, M.D.; Captain W. Harley Davidson, USAF, MC; Group Captain J. R. Jackson, RCAF. *Back row*—Surgeon Captain Frank P. Ellis, RN; Group Captain John R. R. Jenkins, RAF; Lt. Col. Richard B. Austin, MC, USA; Colonel Granger W. Reid, RAMC, representing Major W. P. N. Moore, RAMC, who was absent; Major Willard R. Hawkins, USAF, MC, representing Lt. Col. Charles A. Berry, USAF, MC, who was absent; Captain Carl E. Wilbur, MC, USN. Members not shown are Colonel Frank M. Townsend, USAF, MC; Major Moore and Lt. Col. Berry.

* Quote is from Secretary of Defense press conference on 2 February 1961.

Wing Commander David O. Coons, RCAF, Staff Officer, Medical Services, Canadian Joint Staff, was elected 1961 Chairman of the Committee. He succeeded Colonel Joe M. Blumberg, MC, USA, Deputy Director of AFIP. Captain W. Harley Davidson, USAF, MC, Chief, Aerospace Pathology Branch, AFIP, was elected Secretary.

APPEAR ON CBS TV

Colonel Frank M. Townsend, USAF, MC, The Director of the Armed Forces Institute of Pathology, and Captain W. Harley Davidson, USAF, MC, Chief Aerospace Pathology Branch, appeared on the *CBS Reports* TV show "The Case of the Boston Electra" on February 16.

Colonel Townsend and Captain Davidson presented the Institute's recommendations for rearward facing, properly stressed aircraft seats as a means for increasing passenger safety on commercial aircraft.

FORENSIC SCIENCES SYMPOSIUM

The Third Forensic Sciences Symposium will be held at the Armed Forces Institute of Pathology, Washington, May 2-4, 1961 for the disciplines of medicines, law and law enforcement.

Army

Surgeon General—LT. GEN. LEONARD D. HEATON

Deputy Surg. Gen.—MAJ. GEN. THOMAS J. HARTFORD

ELECTRIC ANESTHESIA

Electric anesthesia, a major research advance that promises to have considerable potential for surgery under combat conditions as well as for civilian medicine, has been successfully used on humans for the first time.

Through continuous electrical impulses, the anesthesia sends the patient into varying degrees of unconsciousness followed by prompt recovery without nausea or other unpleasant post-operative after effects. The patient feels no pain while under the anesthesia and upon awakening remembers nothing about the operation.

The first reported use of this anesthesia on humans came during January 1961 when four patients at the University of Mississippi Medical Center, Jackson, Mississippi, were successfully anesthetized by electronarcosis.

Dr. James D. Hardy, Professor and Chairman, Department of Surgery and Director of Surgical Research, University of Mississippi Medical Center, developed the anesthesia under contract with the U. S. Army Medical Research and Development Command. Working with Dr. Hardy in the development of the anesthesia were, Dr. M. Don Turner, physiologist, and electronics technician C. Don McNeil.

Electric anesthesia equipment consists of an oscillator (frequency generator) which provides 700 cycles of current through an amplified connected to the patient's temples by electrodes.

The patient's mouth is sprayed with a local anesthetic and an "airway tube" is inserted to insure unobstructed breathing. Within seconds the patient is asleep. He remains unconscious until the electric current is turned off, at which time he again awakens in a matter of seconds feeling none of the aftereffects commonly associated with anesthesias.

Dr. Hardy's electric anesthesia research was conducted as part of his general contract work on surgery, metabolism, shock, burns, wound healing and surgical apparatus and techniques.

The simplicity of his new method, and the ease and speed with which patients recover, promise to have significant application not only to the military because of the usefu'ness of electric anesthesia under combat conditions, but also to civilian medicine.

NEW FIRST AID KIT

A newly developed first aid kit that reflects advances in modern medical thinking will help the soldier to better help himself and his fellow fighting man in the future.

The kit is designed to cope with increased casualty rates and with situations where

treatment by medical service personnel may be unavoidably delayed.

This kit was developed at the Army's request by the Medical Equipment Development Laboratory, Ft. Totten, New York. The kit is presently being tested by the three military services and if adopted, it will replace the first aid kit now used by the Army.

Balancing the need for more medical items against weight and size, the kit measures $8 \times 2 \times 4$ inches, weighs about a pound, and can be attached to a standard pistol belt.

These packets were designed so that an injured person can open them quickly and easily even when wearing gloves. In addition, they are water and weather-proof.

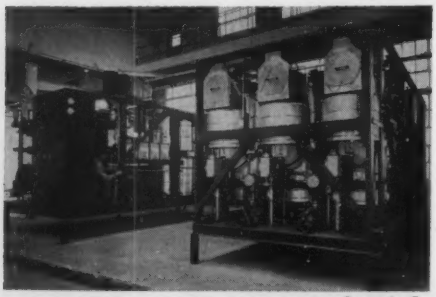
It contains two inner packets, one to be used by the individual himself, and the other can be used to take care of a fellow soldier.

The packet designed for use by the individual himself contains a first aid dressing, adhesive bandage, and iodine water purification tablets.

The second packet can be used by the individual himself or on a fellow soldier. It contains dry electrolyte salts (sodium bicarbonate) to be taken by mouth in case of burns, and absorbent adhesive bandage, individual first aid dressing, muslin bandage, and more water purification tablets.

PORTABLE UNIT GENERATES ANESTHETIC

A new type portable nitrous oxide generator permits recharging of empty cylinders in the field, even during combat. The unit which is built on skids can be loaded in a flying boxcar.



Lummis Co.

PORTABLE NITROUS OXIDE ANESTHETIC GENERATOR

High purity liquid nitrous oxide is produced at the rate of 40 lb. an hour by the generator using the conventional process—decomposition of ammonium nitrate by heat. In field use, ammonium nitrate would be shipped dry bulk in 100 lb. bags to the generator site.

This new type generator will eliminate the need for transporting cylinders of the gas for long distances.

PROMOTION

The Surgeon of USAREUR (U.S. Army, Europe), Joseph H. McNinch, will receive his second star.

General McNinch, a native of Indiana, entered the Army Medical Corps in 1930 after receiving his medical degree from Ohio State University.

SONS FOLLOW FATHER

Brigadier General Floyd L. Wergeland, MC, USA, Executive Director, Office of Dependent's Medical Care, Surgeon General's Office, U. S. Army, has had the pleasure of swearing in his two sons when they took their oaths of office on entering military service. The most recent occasion was that of his son, 2nd Lt. David A. Wergeland, MSC, USA, who is serving on the staff of Brigadier General Clinton S. Lyter, Commanding General of the Walter Reed General Hospital. The brother, Captain Floyd L. Werge-

(L to R) BRIG. GEN. FLOYD L. WERGELAND, MC, USA; 2/LT. DAVID A. WERGELAND, MSC, USA; and CAPT. FLOYD L. WERGELAND, MC, USA.

land, MC, USA, is a physician at the same hospital.

GUEST LECTURER

Colonel George W. Hunter, III, U. S. Army Retired, Lecturer in Microbiology and Biological Sciences at the University of Florida College of Medicine, and co-author of "A Manual of Tropical Medicine" now in its third edition, was recently a guest lecturer at the College of Medicine of the University of Pittsburgh. While there he conducted a short course in Medical Parasitology which was offered to their sophomore medical students.

PERSONAL

Colonel Roland I. Pritikin, MC, USAR, Rockford, Illinois, who is President of the Henry Holland Hospitals Alumni Association and Fund, recently toured the Far East. While there he addressed the Kobe (Japan) Society of Ophthalmology, the Hong Kong Ophthalmological Society, the Philippine Ophthalmological Society, the Department of Ophthalmology, University of the Philippines, and other ophthalmological groups in the Far East.

Colonel Pritikin is a consultant in ophthalmology for the Surgeon General of the Army.

Navy

Surgeon General—REAR ADM. EDWARD C. KENNEY

Deputy Surgeon General—REAR ADM. ALLEN S. CHRISMAN

ADMIRAL HOGAN RETIRED

Rear Admiral Bartholomew W. Hogan, upon his retirement from the Navy on February 28, was awarded the Distinguished Service Medal "for exceptionally meritorious services to the United States as Chief of the Bureau of Medicine and Surgery and Surgeon General of the Navy from February 1955 to February 1961."

Admiral Hogan will be associated with the American Psychiatric Association which maintains offices at 1700—18th Street, N.W., Washington 6, D.C. He specialized in psychiatry while in the naval service.

DEPUTY SURGEON GENERAL

Rear Admiral Allan C. Chrisman, MC, USN, who has been Commanding Officer of the U. S. Naval Hospital, San Diego, and District Medical Officer of the Eleventh Naval District, has been appointed Deputy Surgeon General of the Navy.

Admiral Chrisman entered the Navy Medical Corps after receiving his medical degree from Harvard Medical School in 1930. He advanced through the ranks to that of Rear Admiral, to date from August 1, 1958.

HONORED

Rear Admiral Curtiss W. Schantz, Assistant Chief of the Bureau of Medicine and Surgery (Dentistry), and Chief, Dental Division, was awarded honorary membership in the Academy of General Dentistry at its annual meeting held February 7 in Chicago.

(L to R) DR. G. A. HOLMES, Director, Post Graduate Studies; DR. T. V. WECLEW, President, Academy of General Dentistry; REAR ADMIRAL C. W. SCHANTZ, DC, USN; DR. A. L. KNAB, Secretary-Treasurer; CAPT. C. M. HECK, DC, USN, a Director of Academy.

Other outstanding leaders in the dental profession similarly honored were Gerald D. Timmons, Dean, Temple University Dental School, and Raymond J. Nagle, Dean, College of Dentistry New York University.

PILONIDAL DISEASE

"The presence of excessive hair on the glabella constitutes a significant sign which is helpful in detecting individuals with pilonidal disease." This is a statement of Commander Paul H. Sebrechts, MC, USN, Great Lakes, Illinois in his article "A Significant Diagnostic Sign of Pilonidal Disease" in *Diseases of the Colon & Rectum,* Vol. 4, No. 1, Jan.-Feb. 1961.

Air Force

Surgeon General—MAJ. GEN. OLIVER K. NIESS

Deputy Surg. Gen.—MAJ. GEN. JOHN K. CULLEN

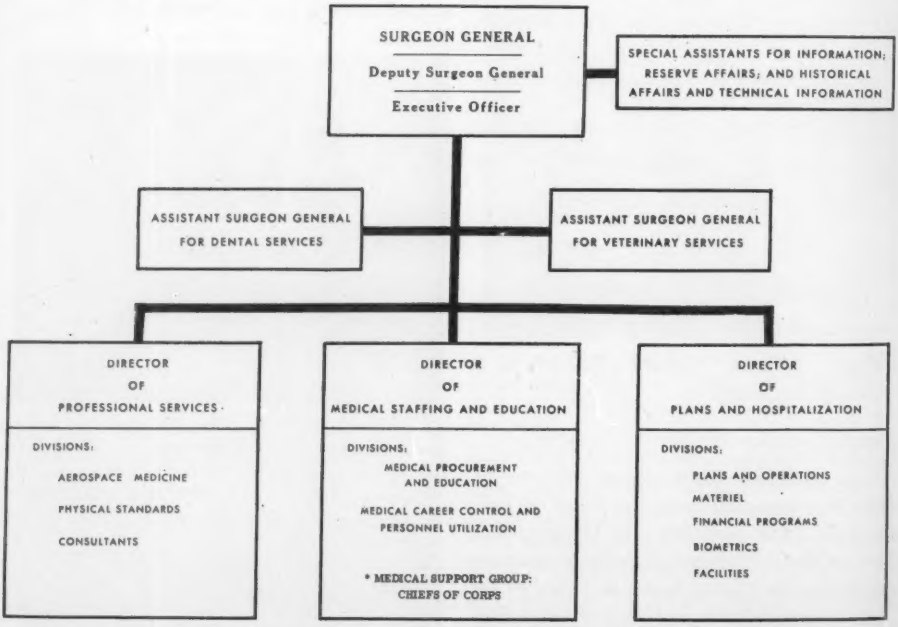
USAF HOSPITAL LACKLAND (SEE COVER)

The USAF Hospital, Lackland, a component of the USAF Aerospace Medical Center, is designed to furnish complete medical care for all personnel authorized such care by current regulations. It is the largest Air Force hospital and the largest single-structure unit in the Department of Defense.

A fully accredited institution, the hospital is staffed by 150 physicians, over one-third of whom are board qualified or board certified specialists. In addition, the hospital has the services of over 70 nationally prominent consulting specialists. Also on the staff are about 200 nurses, 90 other officers, 1,000 airmen and over 300 civilian employees.

A general-teaching hospital, the facility carries on a large intern and residency training program plus a variety of short-course medical and dental training programs. Residency training is offered in general surgery, orthopaedic surgery, radiology, internal medicine, anesthesiology, pediatrics, obstetrics and gynecology, ophthalmology, pathology, urol-

DEPARTMENT OF THE AIR FORCE OFFICE OF THE SURGEON GENERAL



* The Medical Support Group consists of the Chief, Medical Service Corps; Chief Medical Specialist Corps; and Chief, Air Force Nurse Corps. Each Chief of Corps is directly responsible to the Surgeon General, USAF, in matters of special interest to and in the activities of the respective Corps.

ogy and hospital administration. Dental residencies are offered in oral surgery, prosthodontics and periodontology.

The hospital is the largest of five designated histopathology centers in the Air Force. It operates four specialized clinics where clinical investigation is undertaken in the areas of surgery and anesthesiology, pulmonary, cardiac and renal functions.

A three winged, 9-story building, the 1,000-bed hospital was constructed in two 500-bed increments. The first was completed and occupied in 1957 and construction started on the second increment almost immediately. Completed in December 1960, the hospital is a major specialty treatment center for many disorders and as such receives many of its patients from Air Force bases world-wide.

The formal dedication of the new wing, shown at the far right on the photograph on the cover, was held on March 25. Following the ceremony there was a tour of the hospital conducted by the Commander, Brigadier General J. W. Humphreys, Jr. USAF, MC.

ORGANIZATION, SURGEON GENERAL'S OFFICE

The Air Force Medical Service and the Office of the Surgeon General, USAF, were established in 1949. That office has five functional areas, with an Assistant for Dental Services, and Assistant for Veterinary Services, a Director of Professional Services, a Director of Staffing and Education, and a Director of Plans and Hospitalization.

The most significant recent reorganization has been within the Directorate of Professional Services. The Aviation Medicine Division, Preventive Medicine Division, Nuclear Medicine Division, and Office of the Medical Research Advisor were disestablished and concurrently the Aerospace Medicine Division was established to consolidate the functions of those offices into one division. In addition to the Division Chief's Office, the Aerospace Medicine Division has two branches, Flight Medicine and Research Requirements, and Preventive and Occupational Medicine. This functional realignment is gradually being established throughout the Air Force Medical Service down to air base level.

CHANGES IN ASSIGNMENT EXPECTED

With the anticipated retirement of Major General Harold H. Twitchell, Surgeon of the U. S. Air Force Europe, this summer a change of assignment of the Deputy Surgeon General John K. Cullen to succeed General Twitchell is expected.

Brig. General Richard L. Bohannon, now Surgeon of the Pacific Air Command will probably replace Major General Cullen as Deputy Surgeon General.

NOMINATED FOR BG

John R. McGraw, Colonel, Medical Corps, U. S. Air Force, Surgeon of the Strategic Air Command, Offutt Air Force Base, Nebraska, has been nominated for the rank of brigadier general.

AEROMEDICAL EVACUATION

The 1st Aeromedical Evacuation Group (TAC), located at Pope Air Force Base, North Carolina, is an organization providing all the elements of a tactical aeromedical evacuation service from the battle zone to the hospital. The service includes in-flight medical care, operation of casualty staging areas, and evacuation liaison and control.

U. S. Air Force Photo

1ST LT. MARY J. DEHAVEN, Chesterton, Ind., a flight nurse with the 21st Aeromedical Evacuation Squadron, checks simulated casualties being carried aboard a C-123 "Provider" troop carrier aircraft of the 464th Troop Carrier Wing at Pope AFB.

U. S. Air Force Photo

1ST. LT. MARY J. DEHAVEN (left), from Chesterton, Ind., a flight nurse, and SSGT. THOMAS J. FLOW of Joanna, S. C., an aeromedical evacuation technician, administer oxygen to a patient aboard a C-123 "Provider" of the 464th Troop Carrier Wing. Both are members of the 21st Aeromedical Evacuation Squadron at Pope AFB.

The group's primary and continuous objective is the maintenance of combat readiness.

The Group serves as advisory unit for five Casualty Staging Units of the Air Force Reserve over the country. The aeromedics deploy personnel and equipment four times a year to each of these units.

Colonel George C. Bess of St. Louis, Mo., commands the 1st Aeromedical Evacuation Group which has two squadrons, the 21st based at Pope Air Force Base, and the 22nd at Stewart Air Force Base, Tenn. The 21st Squadron is commanded by Captain J. D. Pendleton, and the 22nd by Captain Michael P. Mesaros.

IN SPACE FLIGHT—ANIMALS FIRST, MAN LATER

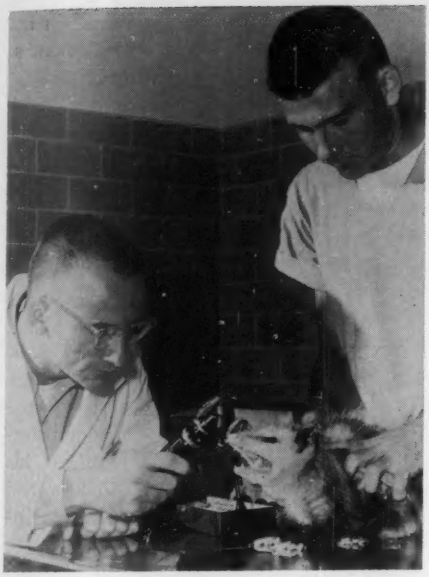
Tests with animals are necessary before man can be risked in space flights. These animals must be carefully selected, meticulously cared for at all times, and observed constantly after they are used in flight. To accomplish all this is the responsibility of the Veterinary Service at Brooks Air Force Base, San Antonio, Texas.

"Research with animals usually starts by applying a new medical technique to the smallest animals—generally mice," says Colonel Harry Gorman, Chief of the Veterinary Service at Brooks Air Force Base. "As development takes place, we work with larger animals until the technique is adaptable to monkeys—and then to man."

A wide range of animals is available so as to provide the particular species that will best solve the researcher's problem. Colonel Gorman and his two assistants, Captain George Anstedt and First Lieutenant Larry Claborn, agree that monkeys probably are the cleverest animals to work with because they are strong and quick. Dogs are the easiest, they said.

Colonel Gorman pointed out, "Some species of animals have traits that make them particularly well adapted to certain experi-

HEARTBEAT becomes heart "beep" as COL. GORMAN uses tiny NCG heart monitor to "listen in" on monkey's ticker. Veterinary Service tests condition and reactions of animals with a full range of modern equipment before the animals ride in missiles and participate in experiments.



EYE EXAMINATION for opossum is given by DR. GEORGE ANSTEDT

ments. Opossums, for instance, have a characteristic of fainting in time of trouble so we use the opossum as a subject to study this problem in humans." Here we have an excellent example of the value of animals in our learning before the need for subjecting human beings to hazardous projects. The projects become less hazardous because of knowledge gained.

Public Health Service

Surgeon General—LUTHER L. TERRY, M.D.
Deputy Surg. Gen.—JOHN D. PORTERFIELD, M.D.

NEW DIVISIONS

Three new divisions have been established in the Bureau of State Services of the Public Health Service.

The Community Health Practice division is headed by Dr. James K. Shafer and will support research to find ways of improving public health practices and medical care administration; assist States and communities in strengthening migrant health, metropolitan, school and other health services; and administer traineeship programs to increase the quality and supply of public health manpower. Most of these functions were performed by the Division of General Health Services, which has now been abolished.

The Accident Prevention Division, headed by Dr. Albert L. Chapman, will cooperate with State and local health and other agencies in developing and improving local accident prevention work, particularly in relation to highway safety, home accidents and accidental poisonings.

The Division of Chronic Diseases, with Dr. Leslie W. Knott as its chief, will deal with the prevention and control of cancer, diabetes, arthritis, heart disease, deficiencies of sight and hearing and will focus especially on health problems of the aged.

The functions now given the Division of Chronic Diseases and Accident Prevention work were formerly performed by the Division of Special Health Services, which is now abolished.

CHILD HEALTH CENTER

President Kennedy has directed that a Child Health Center be established at the National Institutes of Health, at Bethesda, Maryland.

The Center is being set up in the Division of General Medical Sciences at the Institutes.

The President is concerned because of the following facts: there are 400,000 babies born each year with some congenital malformation; since 1950 the United States has gone from sixth to tenth place in the rate of infant deaths; there is an estimate that three out of every 100 children are mentally retarded.

POLIO INJECTIONS

The recommended method for immunizing against polio with the Salk vaccine: after the first injection is given, wait 30 days and give a second injection; then give the third injection after seven months but before the next polio season; a fourth injection is given a year after the third.

Infant inoculation of the Salk vaccine should be made at the age of six weeks. VACCINATE NOW. DON'T WAIT UNTIL THE POLIO SEASON COMES.

GRADUATE TRAINING IN PUBLIC HEALTH

Applications are being accepted by the Public Health Service for graduate training in public health for the 1961-62 academic year.

More than 2800 traineeships have been awarded to individuals either directly by the Public Health Service or through grants to public health training institutions. These trainees included 206 physicians, 1,496 nurses, 243 health educators, 262 sanitary engineers, and 176 sanitarians, as well as dentists, laboratory personnel, nutritionists, and others whose skills are needed in modern public health practice.

The awards provide stipends for living expenses of the trainees in addition to tuition and fees. Information and application forms may be obtained from the Division of Community Health Practice, Public Health Service, Washington 25, D.C.

Veterans Administration

Chief Medical Director—WILLIAM S. MIDDLETON, M.D.

Deputy Chief Med. Dir.—H. MARTIN ENGLE, M.D.

EXCEPTIONAL SERVICE AWARD

Dr. William F. MacFee, Chief of Surgery at the Veterans Administration Hospital, New York City, was awarded the Veterans Administration's highest honor—the Exceptional Service Award.

The award was presented by Dr. William S. Middleton, Chief Medical Director, Veterans Administration, Washington.

The award was given Dr. MacFee "in recognition of his exceptional contributions to the accomplishments of the Veterans Administration in the medical care of veterans, in residency training for physicians, and in clinical research."

Dr. MacFee, a graduate of the Johns Hopkins Medical School (1918), served in the army during World War I for 26 months, entering the service as a private with Base Hospital No. 18 (the Johns Hopkins Unit) in 1917. He was commissioned as a First Lieutenant in the Medical Corps June 6, 1918. He received the Croix de Guerre, the Silver Star, the Victory ribbon with four battle stars, and the Army of Occupation Ribbon.

GENERAL CALLENDER HONORED

Brig. General George R. Callender, Medical Corps, U. S. Army, Retired, who since 1947 has been Director of Pathology and Allied Sciences for the Veterans Administration, recently received recognition for his outstanding contributions to pathology and medicine at the Annual Armed Forces Institute of Pathology Lectures.

Following an introduction by Colonel Frank M. Townsend, USAF, MC, Director of the Armed Forces Institute of Pathology, General Callender received a standing ovation from the 300 pathologists and physicians attending.

General Callender first joined the Institute staff in 1912 when it was known as the Army Medical Museum. He was Director from 1920-1922, and again from 1924-1929. He retired from the Army on November 30, 1946 after 34 years in the military service.

APPOINTMENT

Dr. Lawrence G. Christianson, who has been Chief of the Medical Service at Fort Meade, S.D., has been appointed assistant director of the medical service for the VA.

In this position in Washington he will furnish professional leadership for medical service in the Veterans Administration hospitals and outpatient clinics nationwide.

He received his medical degree from the University of Illinois College of Medicine in Chicago in 1945. He was on active duty with the Army Medical Corps from 1946 to 1952.

SPANISH-AMERICAN WAR VETERANS

There are 134 Spanish-American War veterans around Boston that are the subject

of much discussion at the Boston Veterans Administration Clinic. They have been subjected to all kinds of studies to determine why they are so healthy. Their ages range from 72 to 92 with an average of 82.

Most of the veterans are shorter and rounder than should be expected when we think of long life as belonging to the slender. They should have been candidates for coronary heart disease long ago. They have not thought about reducing diets over the years.

And it is interesting to note that none has developed lung cancer although 25 continue to be heavy smokers and 51 were smokers in the past.

Could it be the pure New England air?

INDIAN WARS VETERANS

There are 37 men alive of the 106,000 soldiers who participated in the military actions against the American Indians. These actions dated from 1860-1898.

TRACE ELEMENTS

Just what effect do the trace elements zinc, copper, tin, cobalt and several others, have on the human body. Are they factors in the production of disease or are they factors in the maintenance of health? These are questions that are not easy to answer. The answers may come from the study that is in progress at the Veterans Administration Hospital in Omaha, Nebraska, where an atomic reactor and an electronic data computer have been installed.

Dr. Richard E. Ogborn, chief of radioisotope service heads the research group that is making the studies.

MEDICAL DIAGNOSIS BY ELECTRONICS

Dr. Hubert V. Pipberger of the Mt. Alto Veterans Administrations hospital, Washington, and Georgetown University School of Medicine, recently reported that a computer has screened electrocardiograms for heart abnormalities with an average of between 95 and 100 percent accuracy in diagnostic decisions.

The computer indicated whether the heart records were normal. The physician enters the picture when the electrocardiogram is reported as abnormal thus saving his time.

The research has been under study since 1957 and has been a joint project with the National Bureau of Standards.

Miscellaneous

HYPERTENSION SYMPOSIUM

The Second Hahnemann Symposium on Hypotension: Recent Developments will be held at the Hahnemann Medical College and Hospital, Philadelphia, May 4-7, incl.

Further information may be obtained by writing to Albert N. Brest, M.D., Head, Section of Hypertension and Renology, Hahnemann Medical College and Hospital, Philadelphia.

MEETING

The Third World Congress of Psychiatry will meet in Montreal, Canada, June 4-10. Simultaneous translations at the sessions will be provided in four languages: English, French, German, and Spanish.

Subjects of interest for fields allied to psychiatry will be presented for those engaged in occupational therapy, nursing, clinical psychology and social work.

Further information may be obtained from: World Congress of Psychiatry, Allan Memorial Institute, 1025 Pine Ave., W., Montreal 2, Canada.

DRUG REACTION REPORTING PROGRAM

Unusual or adverse reactions to drugs is being reported to the Food and Drug Administration by 22 major hospitals. The program has been developed by that Administration for the purpose of quickly knowing about adverse reactions in order that the information may be disseminated to other hospitals and to physicians.

More hospitals are expected to enter into the program.

NEW AND NON-OFFICIAL DRUGS

The 1961 edition of *New and Non-Official Drugs* which is issued under the Direction and Supervision of the Council on Drugs of

the American Medical Association is now in circulation.

This well known annual publication is put out in its customary format. Fifty-four monographs have been added for drugs evaluated since the previous edition one year ago.

Six monographs have been omitted due to inclusion in the U.S.P. or N.F. Six monographs have been omitted as the drugs are no longer available.

The book gives the complete story on every drug listed. Little more need to be said about this important work except that it should be readily available as a reference for those who are prescribing or dispensing drugs.

The publisher is the same as in former years, J. B. Lippincott Company, East Washington Square, Philadelphia 5, Pa. Price per copy is $4.00.

PUBLICATIONS

The U. S. Department of Commerce, Office of Technical Services, Washington 25, D.C., can supply the following:

Ionizing Radiations and the Human Organism: The Search for Means of Protection Against Radiation Contamination (60-31756), 12 pp., price 50¢. Translation from Russian.

Radioactive Iodine in the Diagnosis and Therapy of Cardiovascular Diseases (60-41687), 14 pp., price 50¢. Translation from Russian.

Aerospace Medicine and Biology (Formerly Aviation Medicine), Volume III, 1954 Literature by Jacobius, Kenk, Marrow, Plavnieks, Voulgaris, and Davis (Library of Congress) having 1386 abstracts, is now available. Price is $6.00 a copy. #PB 171029.

Announcement is made that Volume IV, 1955 Literature will be available in May.

ANIMALS TO GET FREEDOM

Instead of cages for the animals freedom of the range will be the rule at the new laboratory at the University of Chicago. Of course, this freedom will have its limits but the animals will live more closely to their native habitat.

Professor of Psychology Eckhard Hess said, "Study of animal behavior in cages is often no more significant than study of man confined to prison population."

In this research study sponsored jointly by the departments of psychology and zoology movie film and sound tape will be used. Will we soon learn what the monkey really thinks about the human being?

ANIMAL EXPERIMENTATION

Bills are being introduced in both the Senate and House of Representatives that could well affect medical research. These would in effect limit the use of animals in experiments that are conducted with only the thought in mind of alleviating human suffering and prolonging human life.

Isn't it somewhat ridiculous on the one hand to appropriate millions for medical research and then tie the hands of the researchers?

WIND TUNNEL

A wind tunnel that will create speeds of more than 3000 miles an hour is being constructed at the University of Arizona. Dr. Edwin K. Parks, professor of mechanical engineering, will be in charge of the tunnel investigations which will simulate conditions of space travel for high-speed missiles and rockets.

SEAT BELTS FOR AUTOS

It has taken some time to put over the importance of seat belts in automobiles. The Department of Health, Education, and Welfare sometime ago issued orders that all official cars of that department were to have seat belts installed.

Now we learn that auto makers will provide seat belt anchors as standard equipment. This is one step forward. Providing the belts will be up to the purchasers of the cars but at least the anchors will be there already installed without the need for special installation.

INVENTIONS WANTED

If you have a hankering for inventing something for the military services get a copy of *Inventions Wanted* which has just been published by the National Inventors Council, Office of Technical Services, U. S. Dep't., of Commerce, Washington 25, D.C. Simply write to that office for your copy. It is free.

PATHOLOGIST WANTED

A part time pathologist is needed in a Texas city. Anyone interested should contact this journal and further information will be given.

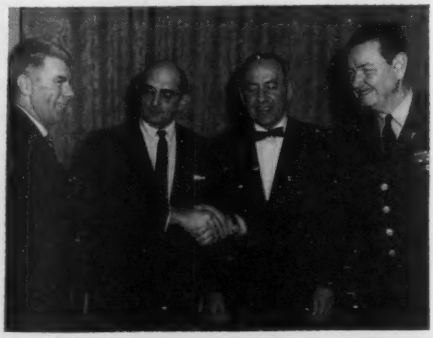
NEW YORK CHAPTER

The Annual Spring Meeting of the New York Chapter of the Association of Military Surgeons of the United States will be held Thursday, June 8, at the Governors Island Officers Open Mess, Governors Island, New York.

Preceding the dinner there will be a cocktail hour (5:30 to 7:00 p.m.). After the dinner, Captain F. Kirk Smith, USN, Director, Aviation Medical Acceleration Laboratory, U. S. Naval Air Development Center, Johnsville, Pa., will speak on "Some Interesting Aspects of Aerospace Medical Research."

Members may bring their ladies. Reservations, to include the cocktail party and the dinner ($6.50 per person) will be accepted by the Secretary, Colonel James Q. Simmons, Jr., Headquarters First U. S. Army, Medical Section, Governors Island, New York 4, New York. *Checks should be made payable to New York Chapter, Association of Military Surgeons-U.S.*

Also a cocktail party is scheduled for Wednesday, June 28, 6:00 to 7:30 p.m., during the American Medical Association Meeting. The party will be held in the Oak Room, National Guard Armory, 33rd St., and Park Ave., New York. All members of the Association of Military Surgeons, whether members of the New York Chapter or not, are invited. This, of course, includes the ladies. Reservations at $3.50 per person. Tickets will also be available at the American Medical Association Meeting.



Officers of N.Y. Chapter, Assoc. Military Surgeons —U.S. (L to R) Lt. Col. Joseph Hirsh, MSC, USAR, *Treasurer;* Major Edward A. Barrett, MC, USAR, *Vice President;* Capt. Samuel Candel, MC, USNR, *President;* Col. James Q. Simmons, MC, USA, *Secretary.*

Honor Roll

Since the publication of our last list, the following sponsored one or more applicants for membership in the Association:

Col. Robert L. Cavenaugh, MC, USA
Col. Nolton E. Fowler, USAF, DC
Col. James Q. Simmons
Col. John W. Ashworth, MC, USAR
Col. H. Wendelken, MC, NY, ANG
Lt. Margaret J. Paulsen, ANC, USA
Lt. Col. Edmund Zabriskie, DC, USAR
Lt. Col. Carl J. Schopfer, MC, NJ, ARNG
A.B.C. Knudson, M.D.
Major Samuel W. Thompson, II, VC, USA
Dr. John A. Trautman
Col. Clark B. Williams, MC, USA
Capt. Wendel E. Buringrud, MSC, USA
Capt. Flora M. MacDonald, ANC, USAR

New Members

Harry H. LeVeen, M.D., F.A.C.S.
LCDR. Margaret R. Shedyak, NC, USNR
Capt. Phillip Kamish, DC, USAF
Major Ermoye A. Stoll, NC, USAF
Col. Lauriston L. Keown, MC, USAR
Francis C. Jackson (VA)
Major Randall L. Clark, USAF, MC
1/Lt. Arthur D. Strathern, Jr., MSC, USAF

Col. Carl G. Whitbeck, MC, NY ARNG
Capt. Catherine T. Betz, ANC, USA
Col. Cloyes T. Hall, M, USAR
Major Joyce J. Kruse, ANC, USA
Capt. Hannah S. Moynahan, ANC, USA
Capt. Marion V. Anderson, ANC, USA
Capt. I. Lloyd Roberts, DC, USAFR
Capt. James S. Kerrigan, DC, USA
Capt. Manuel R. Perez-Varela, MC, USAF
Col. G. J. Strub, MC, USAF
Capt. Harry M. Swartz, MC, NJ, ARNG
Capt. Salvatore Bucolo, MC, NJ, NG
Capt. John Plegge, DC, USA
Major James H. Stuteville, USAF, MC
Staff Pharm. Joseph A. Corcoran, (VA)
Sr. Vet. Off. Keith T. Maddy, USPHS
Major Geraldine L. Whitford, ANC, USA
Major Marjorie J. Wilson, ANC, USA
Major Theodore H. Poe, USAF, MSC
Capt. Nathan R. Rosenthal, MSC, USAR
Col. Barnett Weinstein, MC, USAR
Col. Alvah M. Weiss, MC, USAR
Lt. Col. Arthur L. Butler, DC, USAR
Robert E. Stowell, M.D.
Capt. Paul A. Roberts, MC, Mo., ARNG
Major Edgar Neal Gipson, USAF, MC
Lt. David L. Fishel, DC, USN
Capt. John P. Essepian, DC, USA
1/Lt. Helen B. Anderson, ANC, USA
Capt. G. W. Horkowitz, DC, USA
1/Lt. Terrance M. McHugh, ANC, USAR
Capt. Thomas Ashley Haywood, Jr., DC, USAR
Cdr. Wayne L. Erdbrink, MC, USN
Lt. Charles D. Daily, MC, USNR
Major Thomas J. Tredici, USAF, MC
Manuel C. Fernandez, M.D.
Capt. Fred D. Dittmer, USAF, MSC
Dr. Frederick S. Ranno
Major Leo Arthur Wiener, MC, USA
Capt. Dale R. Lindall, USAF, MC
Dr. F. I. Bloise
Brig. Gen. Maurice C. Harlan, USAF, DC
Col. John H. McCabe, MC, USAR
Capt. Robert M. Davis, DC, USA
Capt. William W. Leak, AAF, (Inac.)
Stanley L. Rea, M.D.
Capt. Seymour Schlussel, MC, USAR
George C. Wee, M.D.
Capt. Bruce P. Anderson, DC, USAR

MEMBERSHIP COMMITTEE

Commander Calvin F. Johnson, MSC, U. S. Navy, Chairman
Mr. George F. Archambault, U. S. Public Health Service
Commander Burdette M. Blaska, NC, U. S. Navy
Colonel Jesse W. Brumfield, MSC, U. S. Army
Lt. Col. Nathan Cooper, U. S. Air Force, (MSC)
Mr. Vernon O. Trygstad, Veterans Administration

Death

O'BRIEN, Daniel J., Commander, Medical Service Corps, U. S. Navy, Retired, died February 20, at the U. S. Naval Hospital, Bethesda, Md. His age was 69.

Commander O'Brien served as the first Head of the Medical Service Corps of the Navy. He was a native of Virginia City, Nevada, and joined the Navy as an apprentice seaman in 1910 and retired in 1953 after 43 years' active service. He served 19 of his 43 years in the Navy in Washington, all at the Bureau of Medicine and Surgery. While at the Bureau from 1920 to 1925 he attended the National University Law School, graduating in 1925. He later was admitted to the District Bar.

He is survived by his widow and a son, Daniel, Jr., 3801 Benton, N.W., Washington 7, D.C.

Interment was in Arlington Cemetery.

NEW BOOKS

Books May Be Ordered Through The Association

Hypothermia and the Effects of Cold. British Medical Bull., Vol. 17, No. 1, January 1961. The British Council, 65 Davies St., London W1. Price $3.25.

Haematology and Blood Groups. Papers from the British Medical Bulletin. Edited by D. A. G. Galton and K. L. B. Goldsmith. Thirty-five contributors. The University of Chicago Press, Chicago. Price $4.00.

Cardiovascular Dynamics. By Robert F. Rushmer, M.D. 2nd Ed. W. B. Saunders Company, Philadelphia and Londan. Price $12.50.

The Surgery of Mitral Stenosis. Modern Surgical Monograph. By Robert P. Glover, M.D., M.S. (Surg.), F.A.C.S., F.A.C.C., and Julio C. Davila, M.D., F.A.C.S., F.A.C.C. Grune & Stratton, New York and London. Price $9.50.

Cell Physiology of Neoplasia. A Collection of Papers Presented at the Fourteenth Annual Symposium on Fundamental Cancer Research, 1960. Published for The University of Texas M.D. Anderson Hospital and Tumor Institute. University of Texas Press, Austin. Price $10.50.

Surgery for Nurses. By James Moroney, M.G., Ch.G., F.R.C.S. (Eng.), L.R.C.P. (Lond.). 7th Ed. The Williams & Wilkins Co., Baltimore, exclusive U.S. agents. Price $7.50.

The Manipulation of Human Behavior. Edited by Albert D. Biderman and Herbert Zimmer; 8 contributors. John Wiley & Sons, Inc., New York and London. Price $7.95.

The Great Epidemic. When The Spanish Influenza Struck. By A. A. Hoehling. Little, Brown and Company, Boston and Toronto. Price $3.95.

Current Therapy—1961. Edited by Howard F. Conn, M.D., with staff of Consulting Editors. W. B. Saunders Company, Philadelphia and London. Price $12.50.

Handbook of Physiology. By R. J. S. McDowall, M.D., D.Sc., M.R.C.P. (Lond.), F.R.C.P. (Edin.). 43rd Ed. J. B. Lippincott Company, Philadelphia. Price $12.50.

Pharmacology. The Nature, Action and Use of Drugs. By Harry Beckman, M.D. 2nd Ed. W. B. Saunders Company, Philadelphia and London. Price $15.50.

Medical-Surgical Nursing. By Kathleen N. Shafer, R.N., M.A.; Janet R. Sawyer, R.N., A.M.; Audrey M. McCluskey, R.N., M.A.; and Edna L. Beck, R.N., M.A. 2nd Ed. The C. V. Mosby Company, St. Louis. Price $8.75.

Medical Entomology. By William B. Herms, Sc.D. Revised by Maurice T. James, Ph.D. 5th Ed. The Macmillan Company, New York. Price $12.50.

The Hand. A Manual and Atlas for the General Surgeon. By Henry C. Marble, M.D., F.A.C.S. W. B. Saunders Company, Philadelphia and London. Price $7.00.

Pneumoconiosis Conference. Proceedings of the Conference held in Johannesburg, February 9-24, 1959. Edited by A. J. Orenstein, M.D., D.Sc., LL.D., F.R.C.P. Little, Brown and Company, Boston, Price $22.50.

Human Factors In Jet and Space Travel. A Medico-Psychological Analysis. Edited by S. B. Sells, Ph.D,. and Lt. Colonel Charles A. Berry, M.D., USAF, MC; with Foreword by Maj. Gen. Oliver K. Niess, The Surgeon General, U. S. Air Force. Thirteen contributors. The Ronald Press Company, New York 10, N.Y. Price $12.00.

Aero-Space Medicine. Edited by Maj. Gen. Harry G. Armstrong, USAF (Ret.). Formerly Surgeon General, U. S. Air Force. Twenty-one contributing authors. The Williams & Wilkins Company, Baltimore. Price $18.00.

American Drug Index—1961. By Charles O. Wilson, Ph.D., and Tony Everett Jones, Ph.D. J. B. Lippincott Company, Philadelphia and Montreal. Price $6.75.

A Student's Guide to Obstetrics and Gynaecology. By Christopher J. Dewhurst, M.B., F.R.C.S. (Ed)., M.R.C.O.G. J. B. Lippincott Company. Philadelphia. Price $4.00.

BOOK REVIEWS

Rypins' Medical Licensure Examinations. 9th Ed. Edited by Walter L. Bierring, M.D., with the collaboration of a panel of 14 reviewers. 805 pp. J. B. Lippincott Company, Philadelphia and Montreal. Price $11.00.

This is the latest revision of a highly helpful, popular book for recent medical school graduates and others planning to take State Board, National Board, or similar type medical examinations. The Editorial Review Panel includes several new authorities in their respective specialties so that the subject matter is really up-to-date.

The double column format is easy to read and convenient for finding special headings. The book opens with a chapter on forms and types of questions in the presently used objective multiple-choice examinations. The subjects are divided into the Basic Medical Sciences of Anatomy, Physiology, Biochemistry, Microbiology, Pathology and Pharmacology, and the Clinical Sciences of Surgery, Internal Medicine, Obstetrics and Gynecology, Preventive Medicine and Public Health, and Psychiatry. Each chapter covers a comprehensive, concise review of the topic followed by a detailed list of questions.

This book is intended as a summary of knowledge needed by the competent general practitioner of medicine. It serves as an incentive to study details in more thorough texts of medicine and surgery. Rypins' philosophy has been well expanded and modernized by Dr. Bierring.

Col. U. Robert Merikangas, USA, Ret.

The Metabolic Basis of Inherited Disease. Edited by John B. Stanbury, M.D., James B. Wyngaarden, M.D., and Donald S. Fredrickson, M.D. 46 contributors. 1477 pp. McGraw-Hill Book Company, Inc., New York, Toronto, London. Price $30.00.

The number of possible combinations of known heritable characteristics far exceeds the human population of the earth. Factors such as environment and linked lethality restrict individual variation within the confines of certain anatomic, chemical and metabolic similarities. With the single exception of monovular twins, however, each member of the human race is genetically unique. From this background of heterogenicity emerges a spectrum of deviations from established norms. At one end of the spectrum are mutations which are so benign in their effect upon the host that they escape recognition. At the other end of the spectrum are mutations which so affect the host that survival or reproductivity is precluded. These also may escape recognition, because viability is excluded. In the middle of the spectrum is an ever-growing number of examples of deviant metabolism, recognized because of obvious clinical abnormalities or because refined technics of metabolic evaluation have pinpointed involved or defective enzyme systems. It is with this group of *inborn errors of metabolism* that this book is concerned. More than forty disorders or groups of disorders are presented in a manner that fuses together the disciplines of clinical medicine, biochemistry and genetics. Highly qualified contributors present reviews of present knowledge of each of the entities discussed. The material is organized under headings of disorders of metabolism or carbohydrate, amino acid, lipid, steroid, purine and pyrimidine, metal, porphyrin and of diseases manifest primarily in the blood and blood-forming tissues and in renal tubular transport. Final consideration is given to diseases involving a deficiency or circulating enzymes or plasma proteins. The presentations are sufficiently detailed to serve as reference material and the excellent annotated bibliography listed after each discussion provides guidance for the researcher. The metabolic and genetic diagrams and other illustrative material are pertinent and well selected to further the effectiveness of the text which is clearly written and easy to follow. Gaps in present knowledge are delineated and areas of probable future advances are indicated. Printing and indexing are excellent. This is a superb book, one which may well become standard in its field. It certainly should be included in all medical reference and department office libraries.

Verono M. Smith, M.D.

A Practice of General Anaesthesia for Neurosurgery. By Robert I. W. Ballantine, H.R.C.S., L.R.C.P., D.A., F.F.A.R.C.S. with collaboration of Ian Jackson, M.R.C.S., L.R.C.P., D.A. 152 pp., 68 illustrations. Little, Brown and Company, Boston, Price $6.50.

This is a short, concise monograph which deals with neurosurgical techniques as primarily practiced by the Staff at St. Bartholomew Hospital in England.

Dr. Ballantine in turn discusses the general considerations and problems of neurosurgical anesthesia, intracranial pressure premedication and anesthetic technique, methods of lowering intracranial pressure, controlled hypotension, hypothermia, individual operations, head injuries.

The methods and techniques discussed are probably fairly standard for anesthesia in Great Britain. However, I don't believe that much of it would be applicable in the United States; especially outside the University and/or Teaching Hospital.

The monograph is interesting to the American anesthesiologist primarily in pointing out other ideas and techniques to which he is accustomed. The book is well written, and reads very easily. Many anesthetic records are shown.

MURRAY ROSEN, M.D.

FUNDAMENTAL ASPECTS OF NORMAL AND MALIGNANT GROWTH. Edited by Wiktor W. Nowinski, Ph.D., 14 contributors. 1025 pp., illust. Elsevier Publishing Company, Amsterdam, London, New York, and Princeton. Price $37.50.

As a result of multitudinous demands, the last five years has witnessed the appearance of multivolume treatises in many specific disciplines of the biological sciences. However, Nowinski, as editor, has presented in one volume a lateral view—bisecting several disciplines—of the fundamental biological property: Growth. This is not a text for the uninitiated, but rather a pervasive examination of the problem for those desiring insight into the contributing fields of research. This tome is a reference work as well as an up-to-date review.

In keeping with these days of molecular biology, the biochemical aspects of growth are emphasized in most of the contributed chapters. As an introduction, S. Kit presented a masterful summary of intermediary metabolism, including an original, removable metabolic map. Other metabolic considerations included contributed chapters by J. Brachet on nucleic acids; H. Herrmann on protein biosynthesis; and nitrogen metabolism by H. Clark. The principles and theories of growth are considered by L. von Bertalanffy; A. M. Dalcq summarized the induction phenomena and germinal organization. Growth is considered from other points of view, namely, in tissue culture, by C. Waymouth; via regeneration, by A. E. Needham; and as a product of wound healing, contributed by W. W. Washburn, Jr. Only one chapter is included to cover the entire field of plant growth; on this behalf, K. V. Thimann's contribution is an authoritative, concise summary.

Malignant growth is considered from three points of view: the late A. Kirschbaum discussed the carcinogenic stimulus; A. C. Griffin the metabolism of the cancer cell; and J. J. Biesele mitotic poisons. Appropriately, the final chapter, submitted by W. Andrew, discussed the aging processes.

Considered as an integrated treatise or as individual contributions, Nowinski has presented a volume that should be called to the attention of all biologists. Where possible, the authors have taken care to discuss the methodology of the investigations in addition to presenting an interpretation and review of experimental results; in addition, the chapters are well annotated. Thus, the volume becomes a valuable reference work as well as an integrated summary of the growth processes.

Except for the binding, the publishers have presented an edition that deserves acclaim as "well done." The reviewer has seen two copies in addition to his own, all of which, unfortunately, had broken or cracked bindings after only a few months use. One can expect, it would seem, a rather structurally perfect volume for the asking price. Nevertheless, such a restriction should not detract from the overall excellence of the treatise.

Although the edition will be found in virtually all large libraries, the reviewer can recommend the inclusion of this work in personal libraries. Since the authors have included literature citations as recent as 1959, this volume will continue as an elegant reference work.

DAVID B. WALDEN, PH.D.

ABANDONED. The Story of the Greely Arctic Expedition 1881-1884. By A. L. Todd. Introduction by Vilhpalmur Stefansson. 315 pp., 16 pp. of maps and photographs. McGraw-Hill, New York. Price $5.95.

Some people read for business—more read for pleasure. This book will satisfy both groups for rarely does the "must" reader find as much real reading pleasure, excitement, and tension as he will in "Abandoned." It's a hard book to put down. Author Todd, without loss of pertinent fact, has not only nicely condensed several published volumes on the Lady Franklin Bay Polar Year Expedition by Greely, Schley, and others into one book, but he has laced the story with historic background, the political turmoil sometimes concomitant with government sponsored expeditions, the machinations of an unusually uninhibited free press after the rescue, and with an epilogue which satisfyingly relates much of interest in the later years of the six survivors.

Books on the polar regions appear in profusion in times of increased exploration, such as the recent International Geophysical Year. Some are reprints of such rare classics as Cherry-Girard's "Worst Journey in the World." Many new books are by axe-grinding expedition members who are not often masters of the big picture or of prose. Some are by professional writers seeking the sensational and incidentally the almighty dollar (or pound sterling). All too rare are books by the Walter Sullivans, masters of writing, thorough researchers, yet fraternally acceptable to "explorers," through their own repeated field experience.

Alden Todd is one of the few new professional writers, like the Fishers and Lansing who wrote of Shackleton, who feel that the truest account of the activities of any man or group of men can be written by a curious, but unbiased observer at a

date so late that no individual may be hurt, yet early enough for the clever and persistent tracker to unearth all possible private letters, diaries, and papers involving this man or group of men.

For some men, driven by duty, emotional outlet, sense of destiny, or out of sheer boredom record in writing the actions, moods, foibles, and emotions of themselves and their fellows. Only by cleverly balancing the greatest number of these individual (and invariably biased) views against each other do the men as individuals or the group as a constantly changing "organism" emerge. To the heroes and cowards, altruists and thieves, the ambitious and the plodders of the Greely tragedy Todd has truly given a long needed third dimension, for he had available for the first time a remarkable number of heretofore unknown and unpublished personal diaries and papers of the principal and most educated members of the expedition to temper previously published views.

The troubles in picking suitable volunteers, properly motivated for such an expedition are disclosed. In addition to a wealth of isolation psychiatry involving the interplay of many widely varying types of personality in the group, this book contains remarkable descriptions of starvation yet with surprisingly few symptoms of scurvy. How the entire group lived as long as they did on the food available, who died, when, and why is fascinating and most thought provoking. Man's inhumanity to man, on an individual and collective basis will stir the emotions. The amazing details of one of the rarest and most justified military executions in the field are told, but the reader truly will not want to know who fired the shots.

Stefansson's interesting and convincing introduction makes it possible for the reader to name with probability those who committed cannibalism. Todd, as in a good "whodunit" subtilely drops clues yet never points a finger.

To the polar bibliophile or the student of polar ecology authoritative books MUST have an index. This authoritative book has a small, and for most purposes, adequate index. To those without maps of their own the book's maps should assist in Todd's excellent third dimension.

As one of the few classics of recent vintage in my rapidly accumulating polar library this book bears my written instructions to my wife—"Don't lend this book to *anyone* without a library card—and not then unless they put up collateral."

CAPT. E. E. HEDBLOM, MC, USN

FRENCH'S INDEX OF DIFFERENTIAL DIAGNOSIS. 8th Ed. Edited by Arthur H. Douthwaite, M.D., F.R.C.P. 1111 pp., 774 illust., 216 in color. The Williams & Wilkins Co., Baltimore, exclusive U.S. agents. Price $24.00.

French's Index of Differential Diagnosis was first published in 1912 and has been a long standing favorite of countless physicians in the English speaking world. Since it is entirely written by British physicians and surgeons, it has a particular appeal to the English.

Basically, the text is an expanded dictionary of symptoms, signs, and eponyms covering vast territories of medicine, surgery, gynecology, ophthalmology, dermatology, neurology and other subspecialties as originally intended by Herbert French.

All twenty authorities are men of wide experience both in medicine and teaching and know how to write. They have made their 8th edition as up-to-date as humanly possible, yet charmingly enough have retained many findings, observations and tests of yesteryear which are still of value and find favor among many physicians.

The illustrations are profuse, well located with reference to the text and color is advantageously employed in many of them.

Besides the alphabetic listing of symptoms and signs, the subject discussed on any particular page is listed at the top of the page. The index is particularly complete and takes up 150 pages.

This is indeed a prodigious work and should prove a most valuable assistant in problems of differential diagnosis. It should be of particular value to internists, generalists, and surgeons.

CAPT. JULIAN LOVE, MC, USN (Ret.)

MEDICINE AS AN ART AND A SCIENCE. By A. E. Clark-Jennedy, M.A., M.D. (Cantab), F.R.C.P. (London); and C. W. Bartley, M.A., D.M. (Oxon), M.D. (McGill), M.R.C.P. (London). 425 pp. J. B. Lippincott Company, Philadelphia and Montreal. Price $6.25.

This is an unusual book. Interestingly the authors who have divided the book into five parts tell "How to Use this Book" which is the preface.

Frankly the authors state that the book is not a textbook. They claim quite truly that the "textbook seems to have become far too long, factual and mentally indigestible to be read from cover to cover." They admit that rapid advance in knowledge requires the inclusion of almost everything in the treatise on disease, hence the length of the textbooks.

In this book the authors have striven for brevity and have attempted to explain diseases. They emphasize observation and study and a working diagnosis. To do something for the patient even before the diagnosis is made is important to them. Placing a list of laboratory reports before the consideration of the patient as a whole is deplored.

The book is a plea particularly made to beginners in medicine to consider the whole patient. An interesting book.

R.E.B.

SPACE BIOLOGY. The Human Factors in Space Flight. By James Stephen Hanrahan and David Bushnell. 263 pp. Basic Books, Inc., New York. Price $6.00.

As indicated in the Foreward to this book, the authors have not attempted to prepare a comprehensive survey of space biology. Rather, they have presented a historical review of the research and development accomplishments in the field of space biology. It is written primarily for the general public in a lucid style. Technical data and explanations are held to a minimum.

This book deals with the hazards inherent to human space flight. Chapters are devoted to the problems of weightlessness, G-forces, the radiations of space, and the logistics of the space cabin. Finally, there is a discussion of the impact of astronautics on society as a whole. The interested reader may delve further by consulting a very thorough bibliography which concludes the book.

The authors are well qualified as they are historians attached to the USAF Missile Development Center at Holloman AFB, N.M., where much of the work discussed in the book has actually taken place. This book can be recommended to the general public and to anyone interested in space biology.

HARRY WEINRAUCH, M.D.

LIGHT COAGULATION. By Gerd Meyer-Schwickerath, M.D. Translated by Stephen M. Drance, M.B., F.R.C.S. (Eng.) 114 pp., illust. The C. V. Mosby Company, St. Louis. Price $9.50.

The present atomic age has again directed the interest of the ophthalmologist to the subject of burns of the retina. No name is linked more securely to the experiments and clinical application of light coagulation to the human eye than that of Gerd Meyer-Schwickerath. It is, therefore, entirely appropriate that he write on this subject summarizing the work in this special and fascinating field.

The author traces the history of our knowledge of radiation effect upon the retina from Theophilus Bonetus (1620-1629) to the present day. The remainder of the book tells the reader of Meyer-Schwickerath's own experiences dating from 1946 in developing his method of light coagulation.

The basic principles and the physical factors of the Zeiss Light Coagulator are discussed; the preliminary examination of the patient, the preparation of the patient, the technique of application, the limitation, contraindications, and some of the complications of light coagulation are presented.

The author reports his clinical experiences with the light coagulator in cases of retinal degeneration, macular holes, as an adjunct to retinal separation surgery, the results of the coagulator in periphlebitis retinae, retinoblastoma, tuberous sclerosis, various inflammatory processes, the treatment of iris tumors, and the formation of new pupillary apertures.

The writing is direct, easy to understand, and well illustrated. This is a very timely publication for the ophthalmologist. No other current book so well reviews the subject of light coagulation and the eye so well. The paper and binding are superior.

CAPT. RUDOLPH P. NADBATH, MC, USN

A SYSTEM OF MEDICAL HYPNOSIS. By Ainslie Meares, M.D., B. Agr. Sci., D.P.M. 484 pp. W. B. Saunders Company, Philadelphia and London. Price $10.00.

This book is practical, thorough in its description of the techniques of hypnosis, and burdened very little with theoretical considerations. The author covers problems of rapport and transference, treatability of various types of disorders, ethical considerations, and almost anything else that might be thought of in connection with hypnosis. The material sometimes seems repetitive, but from the point of view of the beginner this would not necessarily be a criticism. Only the last few chapters deal with the use of hypnosis in branches of medicine other than psychiatry, and in this sense the title of the book may be a little bit misleading. All in all this is probably as good a general source of information on hypnosis, and its uses in medicine, as there is at the present time.

COL. WILLIAM H. ANDERSON, MC, USA

MANUAL OF CARE FOR THE DISABLED PATIENT. By Arthur J. Heather, M.D. 119 pp., illust. The Macmillan Company, New York. Price $3.75.

The treatment regimes simply presented in this text should be of interest to both medical and paramedical staffs. The reasons for performing the procedures are presented in a brief yet adequately explanatory manner. The chapters dealing with "The Neurogenic Bladder," "Urinary Complications and Bladder Training," "Decubitus Ulcers" and "Prosthetics" are particularly recommended in terms of content and illustrations. Some of the treatments prescribed would be of more interest to the physical therapist; however, nurses in hospital and public health situations would find most of the therapeutic measures helpful in the management of their patients and the book useful as a guide in teaching auxiliary personnel and patients' families. The text is recommended for the hospital library because of its emphasis on the preventive aspects in rehabilitation of the disabled patient as well as measures to employ when complications do occur.

LT. COL. EVELYN M. BEDARD, USAF, NC

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